EXHIBIT CB

To: Matthew Gubiotti[gubiotti@google.com]
Cc: Tanya Moore[tanya.moore@sonos.com]; Paul Kafadar[paul.kafadar@sonos.com]; Chris Butts[chris.butts@sonos.com]
From: Willy Chen[/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=51BC14060C884322BEB988ABD07CE47B-WILLY CHEN]
Sent: Wed 1/31/2018 5:04:26 PM Eastern Standard Time
Subject: Re: Patent Discussion
Attachment: Sonos and Google Home (Max) - 2018.1.31.pdf

CONFIDENTIAL AND SUBJECT TO FRE 408

Hi Matt,

It was nice meeting you and Kevin today. Please see attached the pdf of the presentation we went through today. We're available if you have any questions or would like to discuss the slides further.

Please forward this on to Kevin for us (we don't have his email address).

Thanks,

Y. Willy Chen | Sonos, Inc. | 773.954.6339 | willy.chen@sonos.com

---

From: tanya.moore@sonos.com
When: 12:00 PM - 1:00 PM January 31, 2018
Subject: Patent Discussion
Location: https://sonos.zoom.us/j/441325891

Matt, please forward to your colleague who will be joining us. Thanks.

[redacted]

Hi there,

Tanya Moore is inviting you to a scheduled Zoom meeting.

Join Zoom Meeting

iPhone one-tap :	US: +16699006833,,441325891# or +16465588656,,441325891#
Meeting URL:	https://sonos.zoom.us/j/441325891

Join by Telephone

Dial :	+1 646 558 8656 (US Toll) or +1 669 900 6833 (US Toll) +1 877 369 0926 (US Toll Free) +1 877 853 5247 (US Toll Free) China Toll-free: +86 400 669 9381 Netherlands: +31 20 241 0288 Australia: +61 (0) 2 8015 2088 Germany: +49 30 3080 6188 United Kingdom: +44 20 3695 0088 France: +33 1 8288 0188 Denmark: +45 8988 3788 India: 00 800 001 4002
Meeting ID:	441 325 891

International numbers

Join from an H.323/SIP room system

H.323:	162.255.37.11 (US West) 162.255.36.11 (US East) 221.122.88.195 (China) 115.114.131.7 (India) 213.19.144.110 (EMEA) 202.177.207.158 (Australia) 209.9.211.110 (Hong Kong) 64.211.144.160 (Brazil) 69.174.57.160 (Canada)
Meeting ID:	441 325 891
SIP:	441325891@zoomcrc.com

SONOS

Sonos and Google

with Google Home Max analysis

January 31, 2018

Agenda

- Sonos and its Patent Portfolio
- Sonos and Google (2016-present)
- Sonos innovation relevant to Google Home, including Max
- Representative features relevant to all Google Home/Cast
- Representative features currently relevant to Max
- Next steps

Confidential SONOS-SVG2-00043206

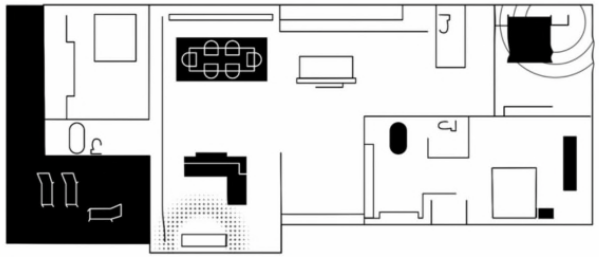
SONOS

What is Sonos?

SONOS

The Home Sound System

Different Songs in Different Rooms

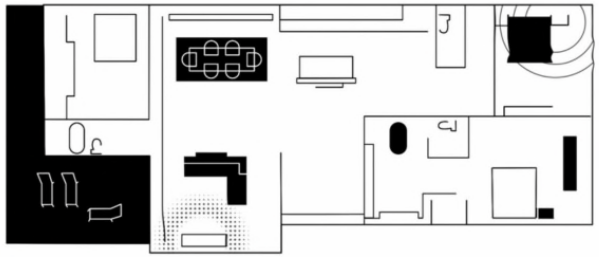


Confidential SONOS-SVG2-00043208

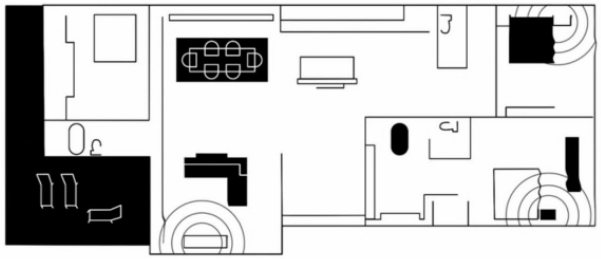
SONOS

The Home Sound System

Different Songs in Different Rooms



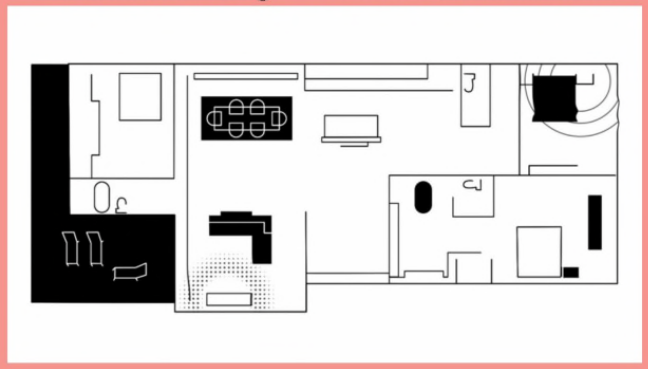
Group Rooms to Play the Same Song



SONOS

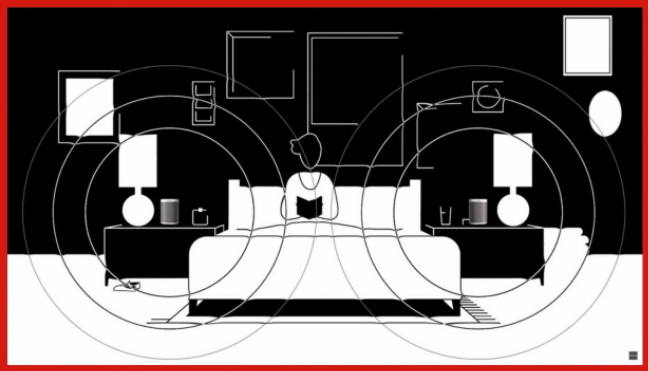
The Home Sound System

Different Songs in Different Rooms



Group Rooms to Play the Same Song

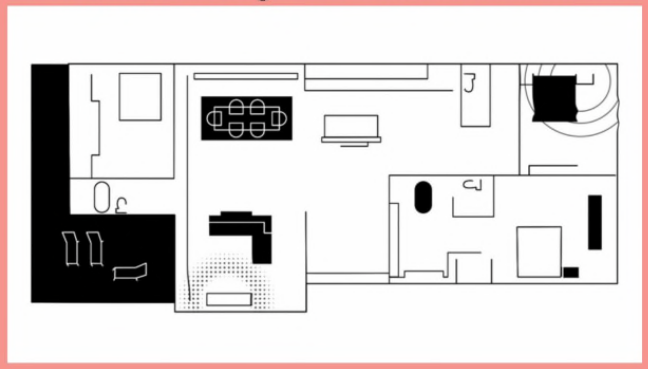
Stereo Pair



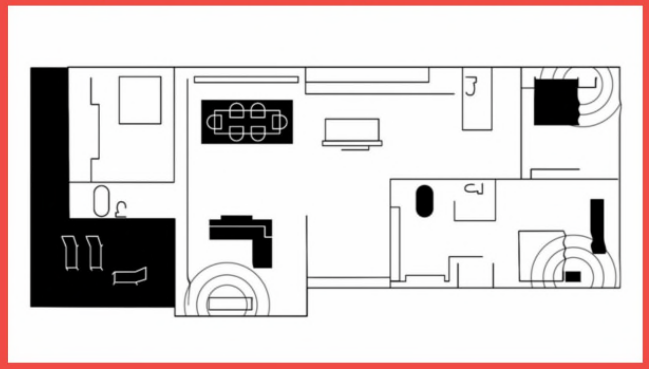
SONOS

The Home Sound System

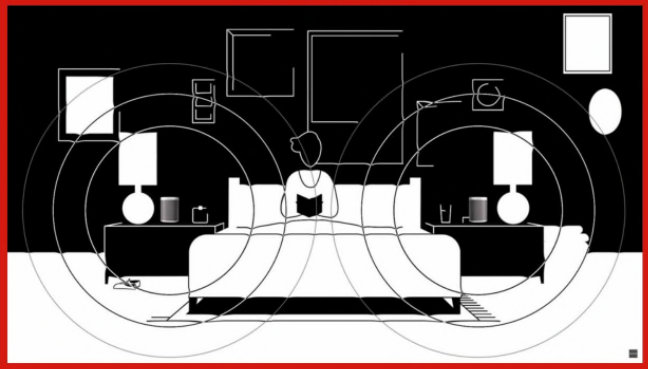
Different Songs in Different Rooms



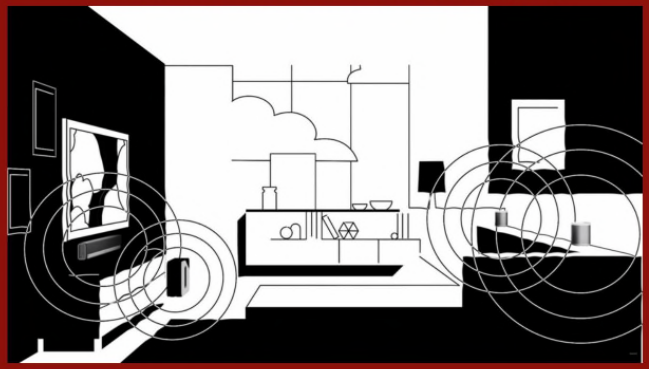
Group Rooms to Play the Same Song



Stereo Pair



Wireless 5.1 Surround Sound



Sonos' Homegrown Portfolio

Sonos Patent Portfolio:

- **450+** U.S. Patents Issued or Allowed
- **1100+** WW Assets, **700+** US Assets
- **~3** new U.S. Patents/Week
- **>50%** Practiced

IEEE Patent Power 2017

- **2nd** in "Electronics"
- **Top 20** in "All" Technologies

IEEE

IEEE Patent Power 2017 - Electronics

Company by Pipeline Power

Company/Organization	Country of Headquarters	Pipeline Power
Apple Inc.	United States	14,285
Sonos Inc.	United States	2,235
LG Electronics Inc.	South Korea	1,960
GoPro Inc.	United States	1,692
iRobot Corp.	United States	1,221
Dolby Laboratories Inc.	United States	1,129
Sony Corp.	Japan	1,101
Canon Inc.	Japan	1,030

https://spectrum.ieee.org/static/interactive-patent-power-2017

Chromecast Audio

Chromecast built-in

Google Home Mini

Google Home

Google Home Max

Google Home

At least 50 Sonos patents across 15 patent families are known to be relevant to the Google Home ecosystem _today_.

Sonos patent subject matter relevant to Google Home:

Audio Content	Platform	Player	Control	Outside Household
Audio from controller	Group management	Antennae switching	Discover/Find content	Cloud queue
Audio from LAN device	Master selection	Audio calibration	Group management	Cross-service integration
Audio via WAN	Networking	Audio processing	Playback control	Retail and marketing
Line-in audio switch	Queue management	Industrial Design	Queue management	Social queues
	Setup	Fault tolerance	Setup	
	Stereo pair	Microphone switching	Social (Party mode)	
	Synchronized playback	Networking	User interface design	
	Voice assistant	Orientation-based audio	Volume control	
		Orientation check		
		Playback control		
		Power management		
		Queue management		

Selected Sonos patent subject matter:

Audio Content	Platform	Player	Control	Outside Household
Audio from controller	Group management	Antennae switching	Discover/Find content	Cloud queue
Audio from LAN device	Master selection	**Audio calibration**	Group management	Cross-service integration
Audio via WAN	Networking	Audio processing	Playback control	Retail and marketing
Line-in audio switch	Queue management	**Industrial Design**	Queue management	Social queues
	Setup	Fault tolerance	Setup	
	Stereo pair	Microphone switching	Social (Party mode)	
	Synchronized playback	Networking	User interface design	
	Voice assistant	**Orientation-based audio**	Volume control	
		Orientation check		
		Playback control		
		Power management		
		Queue management		

* Subject matter in bold became relevant with release of Google Home Max

Selected Sonos patents for discussion:

Audio Content	Platform	Player	Control	Outside Household
Audio via WAN	Group management	**Audio calibration**	Group management	
US9,727,302	US9,348,824	US9,219,460	US8,843,228	
	Stereo pair	**Industrial Design**	Volume control	
	US9,202,509	D768,602	US8,588,949	
	US9,219,959	D796,447		
	15/228,685 (Allowed)	**Orientation-based audio**		
	Voice assistant	US9,042,556		
	US9,826,306	US9,748,647		
	US9,820,039	**Orientation check**		
		US9,367,611		
		Playback control		
		US9,671,780		
		Power management		
		US9,252,721		

US Patent No.: 9,727,302

SONOS

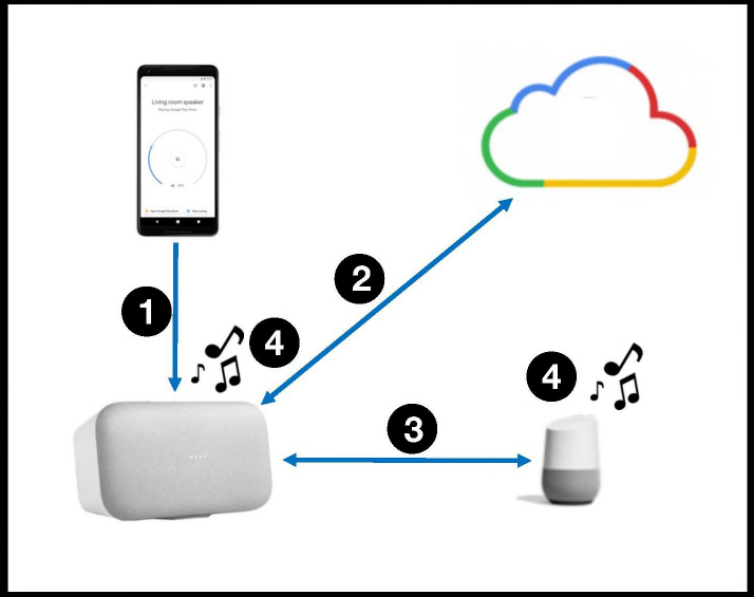
Title: Obtaining content from remote source for playback

Priority Date: 7/28/2003

Issue Date: 8/8/2017

This patent involves a first independently clocked playback device:

1. Receiving from a controller, audio source information via a WAN.
2. Obtaining audio based on the audio source information.
3. Transmitting to a second independently clocked device, (i) the audio, (ii) playback timing information corresponding to the audio, and (iii) device clock information of the playback device.
4. Playing back the audio in synchrony with the second playback device.



Confidential SONOS-SVG2-00043218

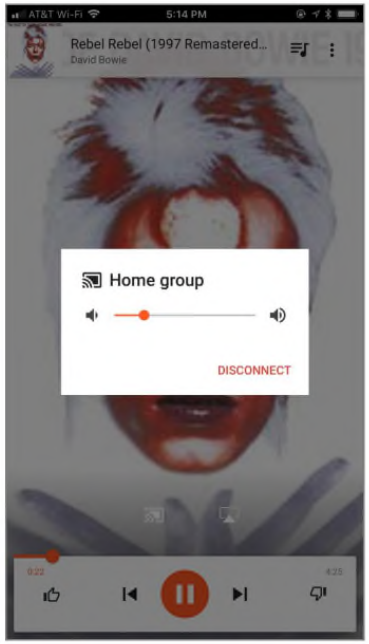
Obtaining content from remote source for playback

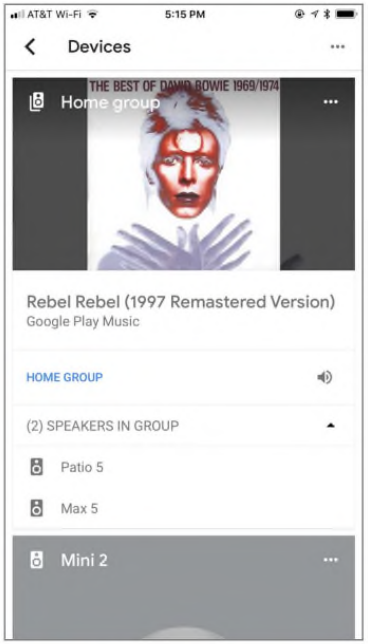
U.S. Patent No. 9,727,302; 7/28/2003

1. A method comprising:

receiving, by a first playback device from a network device configured to control the first playback device and communicatively coupled to the first playback device over a network, control information identifying an audio information source… accessible … via a wide area network (WAN); and

after receiving the control information (i) obtaining, by the first playback device from the audio information source, audio information; (ii) transmitting, by the first playback device to a second playback device, the audio information, playback timing information associated with the audio information, and device clock information of the first playback device; and (iii) playing back, by the first playback device, the audio information in synchrony with the second playback device by using the playback timing information associated with the audio information and the device clock information of the first playback device to play back the audio information, ….





A Home device receives from a Chromecast-enabled application (i.e. Google Play Music), information identifying an audio source.

The Home device obtains audio from the identified audio source.

* see claim 1 of U.S. Patent 9,727,302 for complete claim language

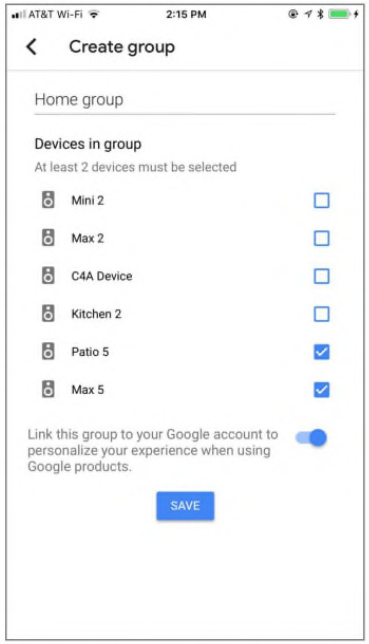
Obtaining content from remote source for playback

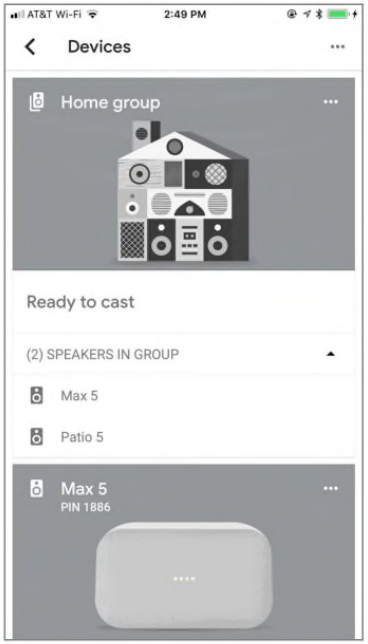
U.S. Patent No. 9,727,302; 7/28/2003

1. A method comprising:

receiving, by a first playback device from a network device configured to control the first playback device and communicatively coupled to the first playback device over a network, control information identifying an audio information source… accessible … via a wide area network (WAN); and

after receiving the control information (i) obtaining, by the first playback device from the audio information source, audio information; (ii) transmitting, by the first playback device to a second playback device, the audio information, playback timing information associated with the audio information, and device clock information of the first playback device; and (iii) playing back, by the first playback device, the audio information in synchrony with the second playback device by using the playback timing information associated with the audio information and the device clock information of the first playback device to play back the audio information, ….





Master Home device in a group transmits clock timing information, audio information, and corresponding playback timing information.

* see claim 1 of U.S. Patent 9,727,302 for complete claim language

Obtaining content from remote source for playback

U.S. Patent No. 9,727,302; 7/28/2003

1. A method comprising:

receiving, by a first playback device from a network device configured to control the first playback device and communicatively coupled to the first playback device over a network, control information identifying an audio information source… accessible … via a wide area network (WAN); and

after receiving the control information (i) obtaining, by the first playback device from the audio information source, audio information; (ii) transmitting, by the first playback device to a second playback device, the audio information, playback timing information associated with the audio information, and device clock information of the first playback device; and (iii) playing back, by the first playback device, the audio information in synchrony with the second playback device by using the playback timing information associated with the audio information and the device clock information of the first playback device to play back the audio information, ….

* see claim 1 of U.S. Patent 9,727,302 for complete claim language

Home devices in the group play audio in synchrony based on the exchanged audio information, playback timing information, and device clock information.

"So we made sure to design Google Home so they can work better together. For example, we've enabled multi-room audio support across Google Home devices. This allows you to create a group and play the same song across the devices at the same exact time." - Rishi Chandra, October 4, 2016

*https://www.youtube.com/watch?v=zLHbdRsBCLg; 16:45-17:20

US Patent No.: 8,588,949; 90/013,423

Litigated | Re-Examined

SONOS

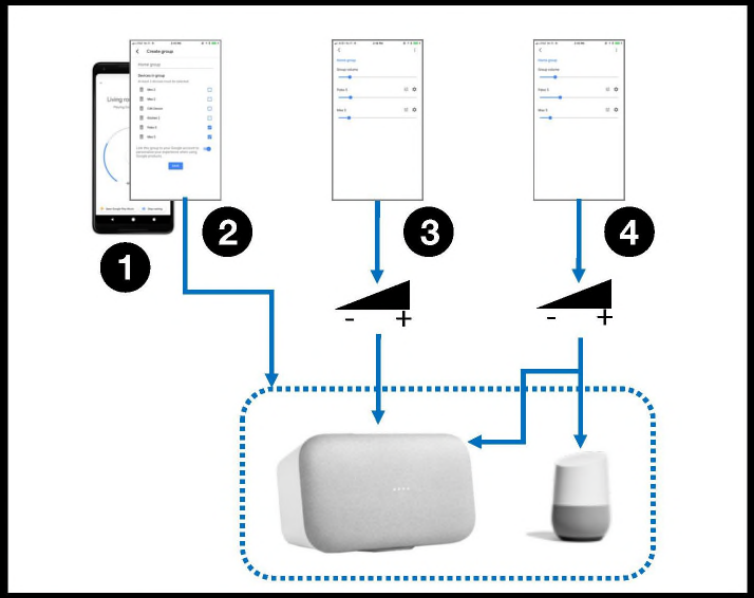
Title: Method and apparatus for adjusting volume in a multi-zone system

Priority Date: 06/05/2004

Issue Date: 11/19/2013; 11/5/2015

This patent involves a controller device:

1. Providing an interface for a player group.
2. Accepting input to facilitate forming a player group.
3. Accepting input to adjust a volume of an individual player in the player group.
4. Accepting input to adjust a volume of the player group.



Litigation: Sonos Inc. v. D&M Holdings Inc.[1:14-cv-01330]

Method and apparatus for adjusting volume levels in multi-zone system

U.S. Patent No. 8,588,949 (90/013,423); 6/05/2004

Litigated | Re-Examined

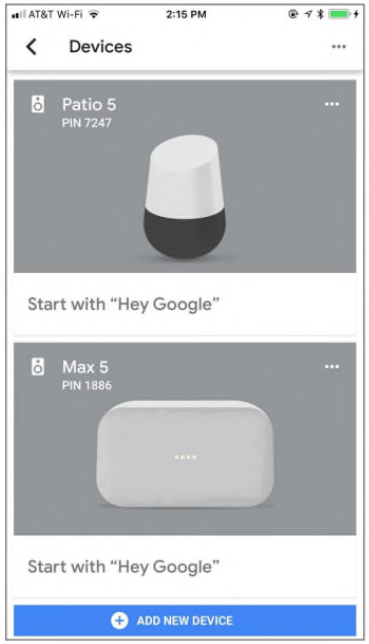
1. A multimedia controller … configured to:

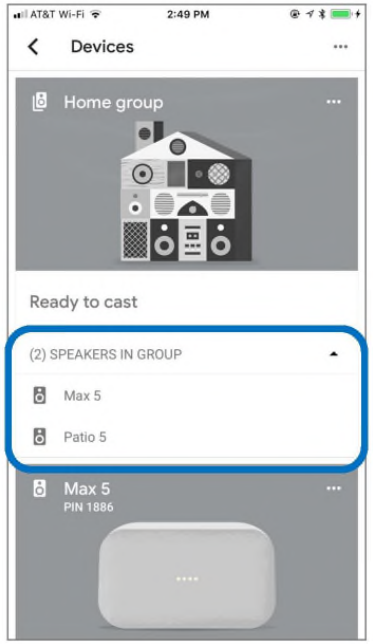
provide a user interface for a player group, wherein the player group includes a plurality of players in a local area network…;

accept via the user interface an input to facilitate formation of the player group, wherein the input to facilitate formation of the player group indicates that at least two of the plurality of players in the local area network are to be included in the player group …;

for any individual player in the player group, accept via the user interface a player-specific input to adjust a volume of that individual player, wherein the player-specific input to adjust the volume of that individual player causes that individual player to adjust its volume; and

accept via the user interface a group-level input to adjust a volume associated with the player group, wherein the group-level input to adjust the volume associated with the player group causes each of the players in the player group to adjust its respective volume.





* see claim 1 of U.S. Patent 8,588,949 for complete claim language

Method and apparatus for adjusting volume levels in multi-zone system

U.S. Patent No. 8,588,949 (90/013,423); 6/05/2004

Litigated | Re-Examined

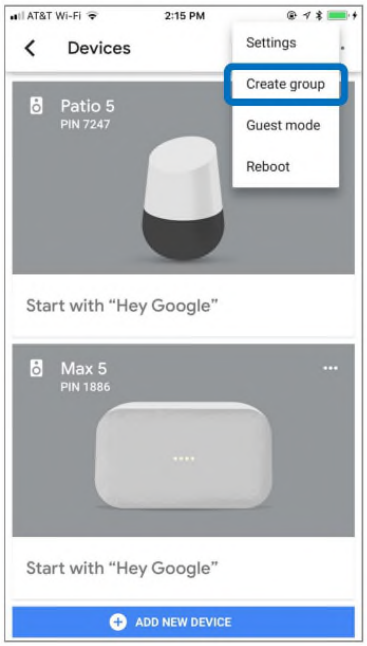
1. A multimedia controller … configured to:

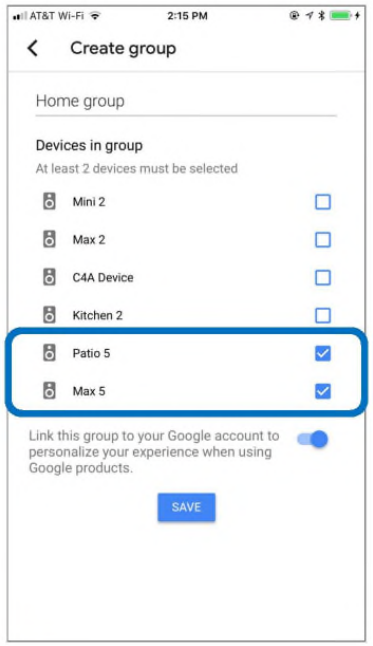
provide a user interface for a player group, wherein the player group includes a plurality of players in a local area network…;

accept via the user interface an input to facilitate formation of the player group, wherein the input to facilitate formation of the player group indicates that at least two of the plurality of players in the local area network are to be included in the player group …;

for any individual player in the player group, accept via the user interface a player-specific input to adjust a volume of that individual player, wherein the player-specific input to adjust the volume of that individual player causes that individual player to adjust its volume; and

accept via the user interface a group-level input to adjust a volume associated with the player group, wherein the group-level input to adjust the volume associated with the player group causes each of the players in the player group to adjust its respective volume.





* see claim 1 of U.S. Patent 8,588,949 for complete claim language

Method and apparatus for adjusting volume levels in multi-zone system

U.S. Patent No. 8,588,949 (90/013,423); 6/05/2004

Litigated | Re-Examined

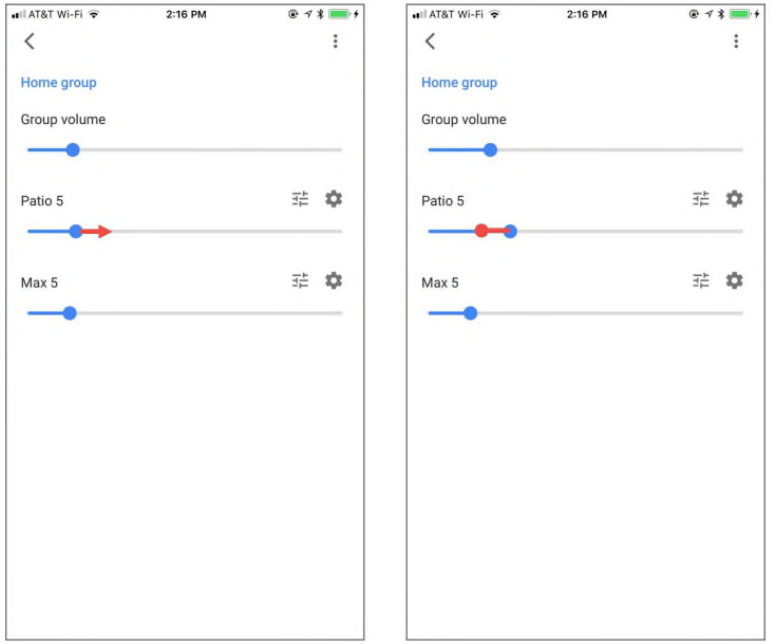
1. A multimedia controller … configured to:

provide a user interface for a player group, wherein the player group includes a plurality of players in a local area network…;

accept via the user interface an input to facilitate formation of the player group, wherein the input to facilitate formation of the player group indicates that at least two of the plurality of players in the local area network are to be included in the player group …;

for any individual player in the player group, accept via the user interface a player-specific input to adjust a volume of that individual player, wherein the player-specific input to adjust the volume of that individual player causes that individual player to adjust its volume; and

accept via the user interface a group-level input to adjust a volume associated with the player group, wherein the group-level input to adjust the volume associated with the player group causes each of the players in the player group to adjust its respective volume.



* see claim 1 of U.S. Patent 8,588,949 for complete claim language

Method and apparatus for adjusting volume levels in multi-zone system

U.S. Patent No. 8,588,949 (90/013,423); 6/05/2004

Litigated | Re-Examined

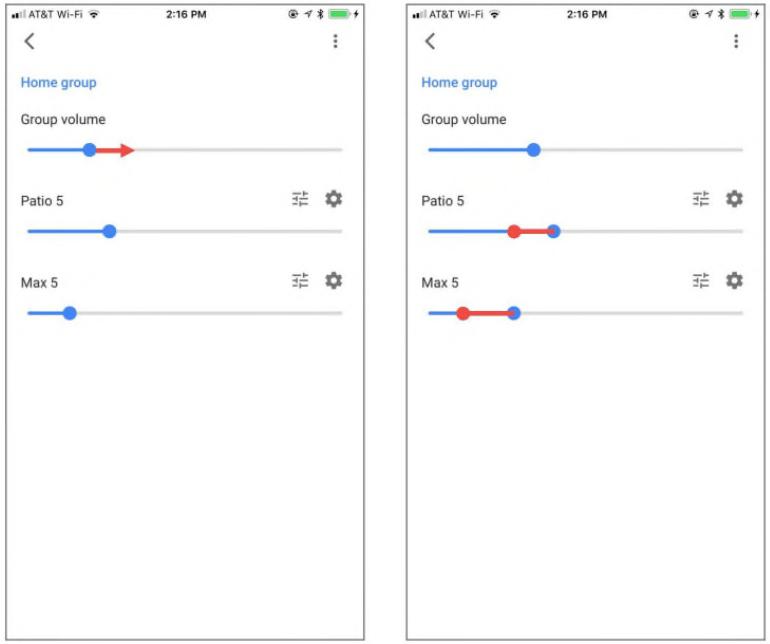
1. A multimedia controller … configured to:

provide a user interface for a player group, wherein the player group includes a plurality of players in a local area network…;

accept via the user interface an input to facilitate formation of the player group, wherein the input to facilitate formation of the player group indicates that at least two of the plurality of players in the local area network are to be included in the player group …;

for any individual player in the player group, accept via the user interface a player-specific input to adjust a volume of that individual player, wherein the player-specific input to adjust the volume of that individual player causes that individual player to adjust its volume; and

accept via the user interface a group-level input to adjust a volume associated with the player group, wherein the group-level input to adjust the volume associated with the player group causes each of the players in the player group to adjust its respective volume.



* see claim 1 of U.S. Patent 8,588,949 for complete claim language

US Patent No.: 9,348,824

Title: Device group identification

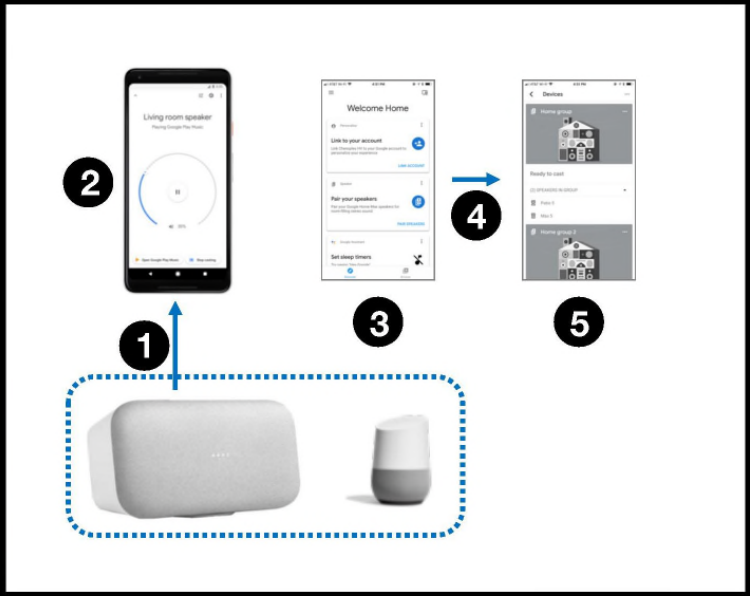
Priority Date: 6/18/2014

Issue Date: 5/24/2016

SONOS

This patent involves a controller device:

1. Receiving from a playback device, a transmission indicating a group identification of a particular zone group.
2. Storing data indicating that the playback device. is associated with the group identification
3. Receiving an input to display representation of zone groups.
4. Identifying the playback device based on the group identification.
5. Displaying a representation of of the particular zone group.



Device group identification

U.S. Patent No. 9,348,824; 6/18/2014

1. A method comprising:

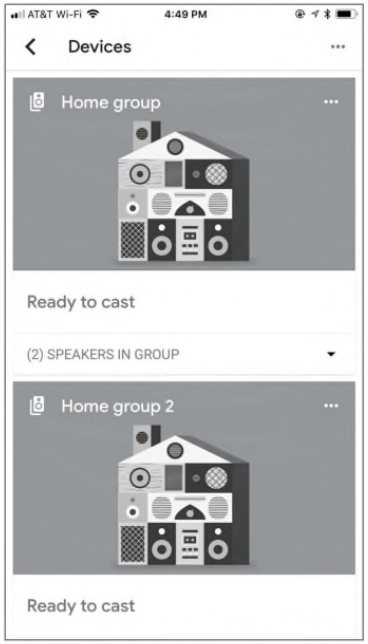
receiving, by a controller device from a playback device of a media playback system, a transmission indicating a group identification corresponding to a particular zone group in the media playback system;

storing, by the controller device, in data storage, data indicating that the playback device is associated with the group identification;

after storing the data in the data storage, receiving, by the controller device, an input to display representations of zone groups in the media playback system;

responsive to receiving the input, identifying, by the controller device in the data storage, the playback device based on the group identification indicated in the received transmission; and

causing, by the controller device, a controller interface to display a representation of the particular zone group according to the group identification, wherein the representation indicates that the playback device is a part of the particular zone group.



When initializing Google Home app, information indicating available groups and devices are received and displayed.

Refresh of available groups and devices can also be initiated within the app, during which updated information is received.

Device group identification

U.S. Patent No. 9,348,824; 6/18/2014

1. A method comprising:

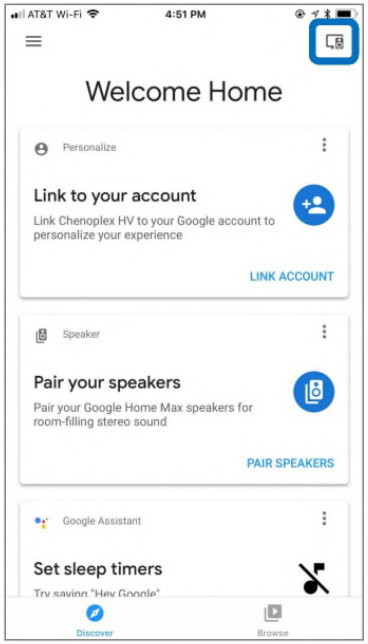
receiving, by a controller device from a playback device of a media playback system, a transmission indicating a group identification corresponding to a particular zone group in the media playback system;

storing, by the controller device, in data storage, data indicating that the playback device is associated with the group identification;

after storing the data in the data storage, receiving, by the controller device, an input to display representations of zone groups in the media playback system;

responsive to receiving the input, identifying, by the controller device in the data storage, the playback device based on the group identification indicated in the received transmission; and

causing, by the controller device, a controller interface to display a representation of the particular zone group according to the group identification, wherein the representation indicates that the playback device is a part of the particular zone group.



After the information is received and stored, an icon is selectable to display available groups and devices.

Device group identification

U.S. Patent No. 9,348,824; 6/18/2014

1. A method comprising:

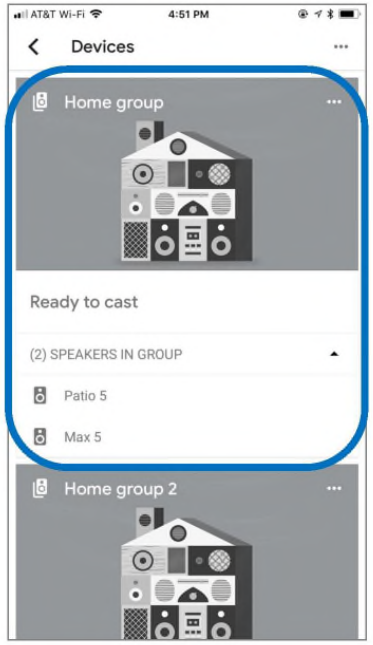
receiving, by a controller device from a playback device of a media playback system, a transmission indicating a group identification corresponding to a particular zone group in the media playback system;

storing, by the controller device, in data storage, data indicating that the playback device is associated with the group identification;

after storing the data in the data storage, receiving, by the controller device, an input to display representations of zone groups in the media playback system;

responsive to receiving the input, identifying, by the controller device in the data storage, the playback device based on the group identification indicated in the received transmission; and

causing, by the controller device, a controller interface to display a representation of the particular zone group according to the group identification, wherein the representation indicates that the playback device is a part of the particular zone group.



Available groups, and devices in the available groups are displayed based on the previously received and stored information.

US Patent No.: 8,843,228

SONOS

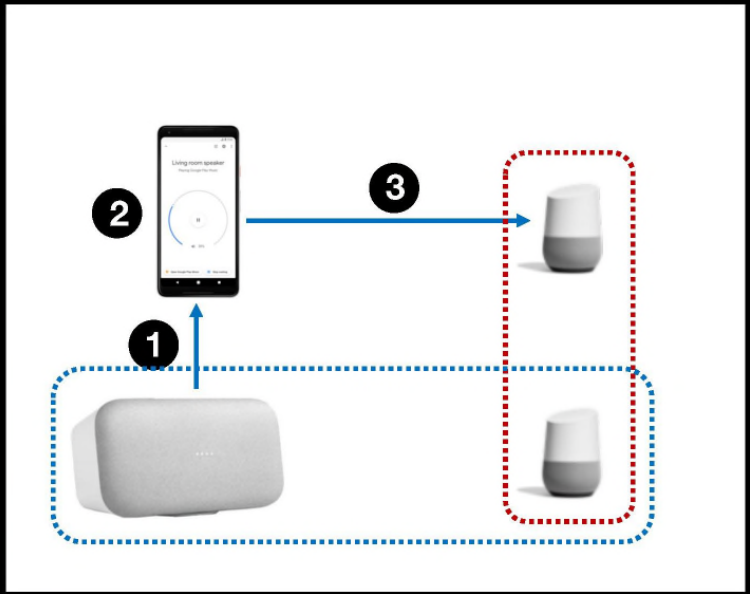
Title: Method and apparatus for updating zone configurations in a multi-zone system

Priority Date: 9/12/2006

Issue Date: 9/23/2014

This patent involves a controller device:

1. Receiving zone configuration characterizing one or more zone scenes.
2. Receiving an input to invoke one of the one or more zone scenes.
3. Based on the input, instructing two or more playback devices to form a group based on the invoked zone scene.



Method and apparatus for updating zone configurations in a multi-zone system

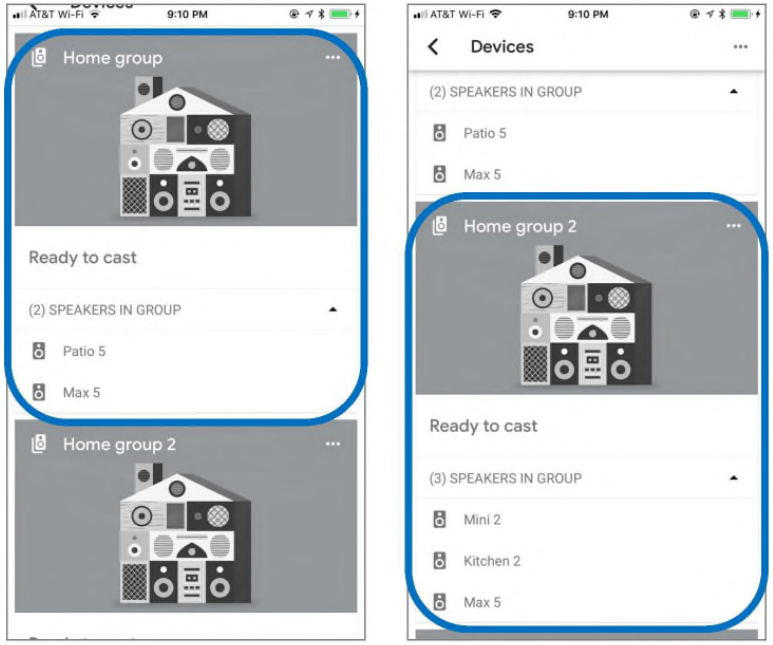
U.S. Patent No. 8,843,228; 9/12/2006

1. In a network comprising a plurality of independent playback devices, a method comprising:

receiving via the network by a controller device, a zone configuration from one of the plurality of independent playback devices, wherein the zone configuration is maintained at one or more of the plurality of independent playback devices, and wherein the zone configuration characterizes one or more zone scenes, each zone scene identifying a group configuration associated with two or more of the plurality of independent playback devices;

receiving, by the controller device, an input to invoke a zone scene of the one or more zone scenes; and

based on the input, instructing, by the controller device, two or more of the plurality of independent playback devices to be grouped in accordance with the invoked zone scene.



Zone scenes are populated on screen based on zone configuration information received from the playback device(s).

* see claim 1 of U.S. Patent 8,843,228 for complete claim language

Method and apparatus for updating zone configurations in a multi-zone system

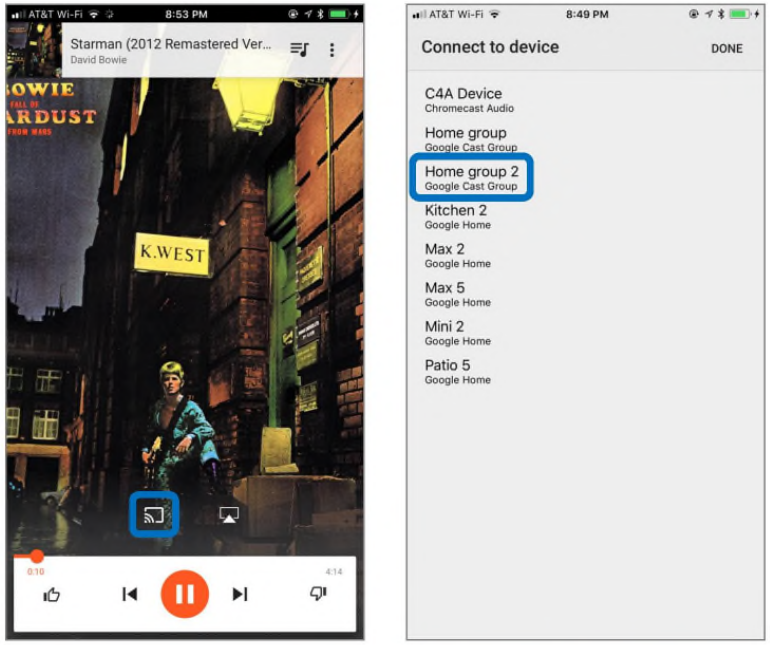
U.S. Patent No. 8,843,228; 9/12/2006

1. In a network comprising a plurality of independent playback devices, a method comprising:

receiving via the network by a controller device, a zone configuration from one of the plurality of independent playback devices, wherein the zone configuration is maintained at one or more of the plurality of independent playback devices, and wherein the zone configuration characterizes one or more zone scenes, each zone scene identifying a group configuration associated with two or more of the plurality of independent playback devices;

receiving, by the controller device, an input to invoke a zone scene of the one or more zone scenes; and

based on the input, instructing, by the controller device, two or more of the plurality of independent playback devices to be grouped in accordance with the invoked zone scene.



An input on the controller can invoke a zone scene of the one or more zone scenes.

* see claim 1 of U.S. Patent 8,843,228 for complete claim language

Method and apparatus for updating zone configurations in a multi-zone system

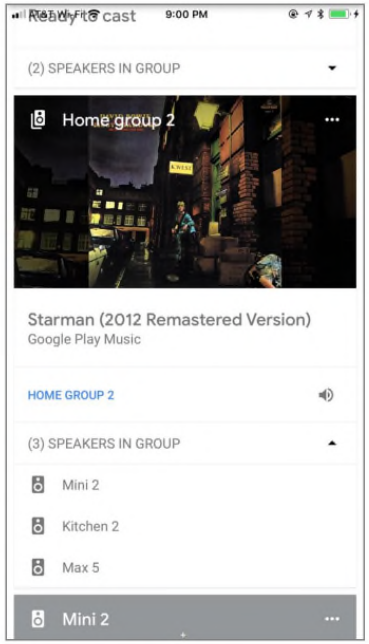
U.S. Patent No. 8,843,228; 9/12/2006

1. In a network comprising a plurality of independent playback devices, a method comprising:

receiving via the network by a controller device, a zone configuration from one of the plurality of independent playback devices, wherein the zone configuration is maintained at one or more of the plurality of independent playback devices, and wherein the zone configuration characterizes one or more zone scenes, each zone scene identifying a group configuration associated with two or more of the plurality of independent playback devices;

receiving, by the controller device, an input to invoke a zone scene of the one or more zone scenes; and

based on the input, instructing, by the controller device, two or more of the plurality of independent playback devices to be grouped in accordance with the invoked zone scene.



The playback devices in the invoked zone scene begin playing back audio as a group.

* see claim 1 of U.S. Patent 8,843,228 for complete claim language

US Patent No.: 9,826,306

SONOS

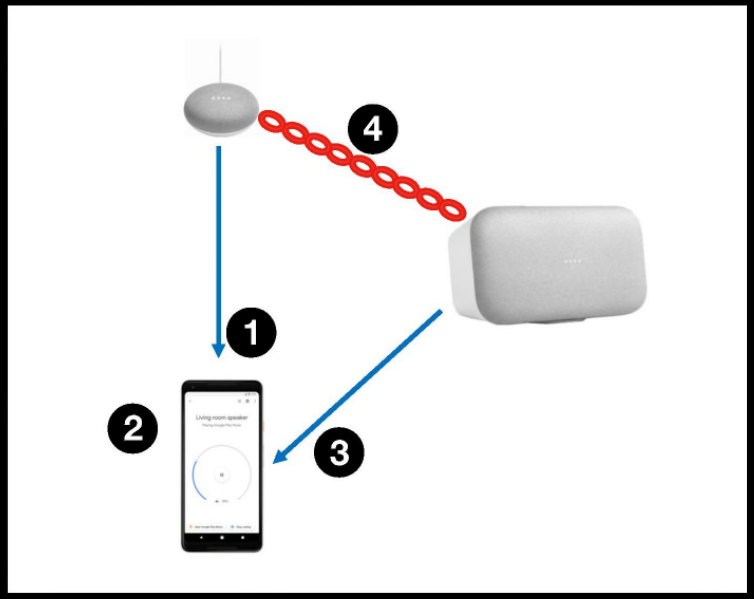
Title: Default playback device designation

Priority Date: 2/22/2016

Issue Date: 11/21/2017

This patent involves a computing device:

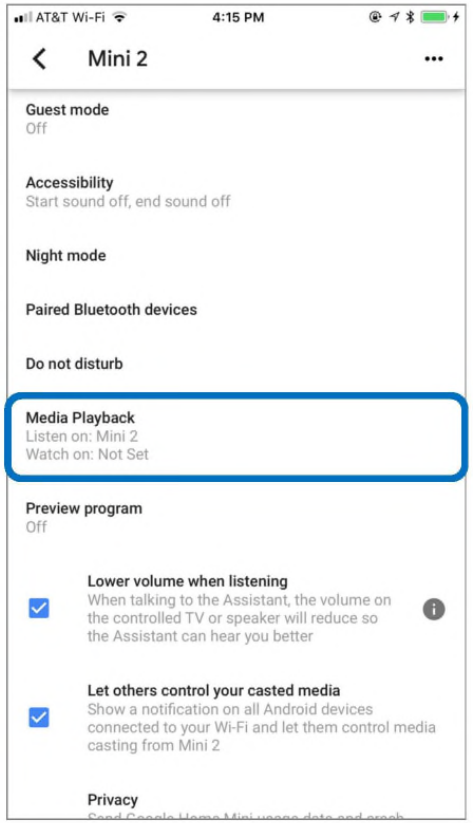
1. Determining that a network microphone device is available for assignment.
2. Display prompt to select from a plurality of playback zone.
3. Receiving an input indicating a selection a playback zone to assign as the default output device for the network microphone device.
4. Causing the assignment to be stored.



Default playback device designation

U.S. Patent No. 9,826,306; 2/22/2016

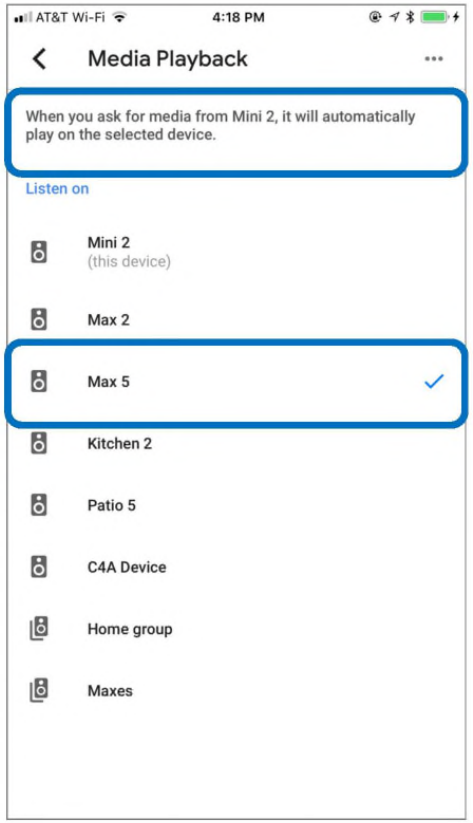
1. A computing device comprising:
a processor; and
memory having stored thereon instructions executable by the computing device to perform functions comprising:
determining that a network microphone device is available for assignment to one of a plurality of playback zones within a local playback network;
displaying a prompt to select among the plurality of playback zones, a given playback zone to which the network microphone device is to be assigned, wherein assigning the given playback zone to the network microphone device comprises configuring the playback device of the given playback zone to be a default output device in response to voice inputs received via the network microphone device;
receiving an input indicating a selection of a particular playback zone of the plurality of playback zones; and
causing to be stored data indicating an assignment of the network microphone device to the particular playback zone.



Default playback device designation

U.S. Patent No. 9,826,306; 2/22/2016

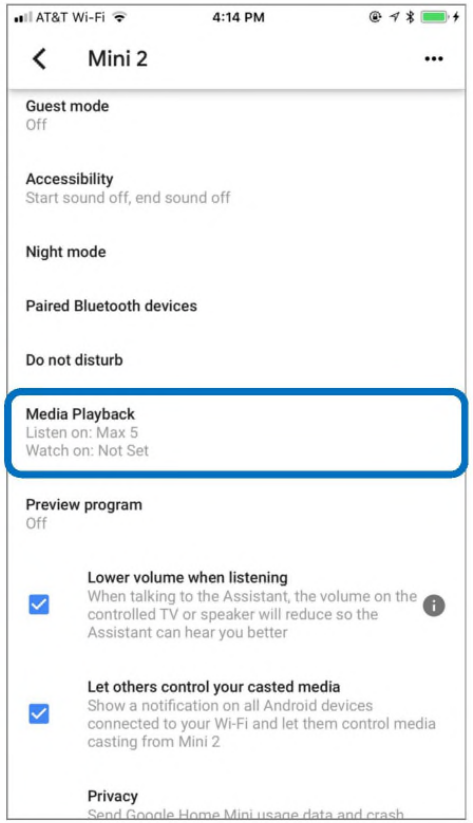
1. A computing device comprising:
a processor; and
memory having stored thereon instructions executable by the computing device to perform functions comprising:
determining that a network microphone device is available for assignment to one of a plurality of playback zones within a local playback network;
displaying a prompt to select among the plurality of playback zones, a given playback zone to which the network microphone device is to be assigned, wherein assigning the given playback zone to the network microphone device comprises configuring the playback device of the given playback zone to be a default output device in response to voice inputs received via the network microphone device;
receiving an input indicating a selection of a particular playback zone of the plurality of playback zones; and
causing to be stored data indicating an assignment of the network microphone device to the particular playback zone.



Default playback device designation

U.S. Patent No. 9,826,306; 2/22/2016

1. A computing device comprising:
a processor; and
memory having stored thereon instructions executable by the computing device to perform functions comprising:
determining that a network microphone device is available for assignment to one of a plurality of playback zones within a local playback network;
displaying a prompt to select among the plurality of playback zones, a given playback zone to which the network microphone device is to be assigned, wherein assigning the given playback zone to the network microphone device comprises configuring the playback device of the given playback zone to be a default output device in response to voice inputs received via the network microphone device;
receiving an input indicating a selection of a particular playback zone of the plurality of playback zones; and
causing to be stored data indicating an assignment of the network microphone device to the particular playback zone.



US Patent No.: 9,820,039

SONOS

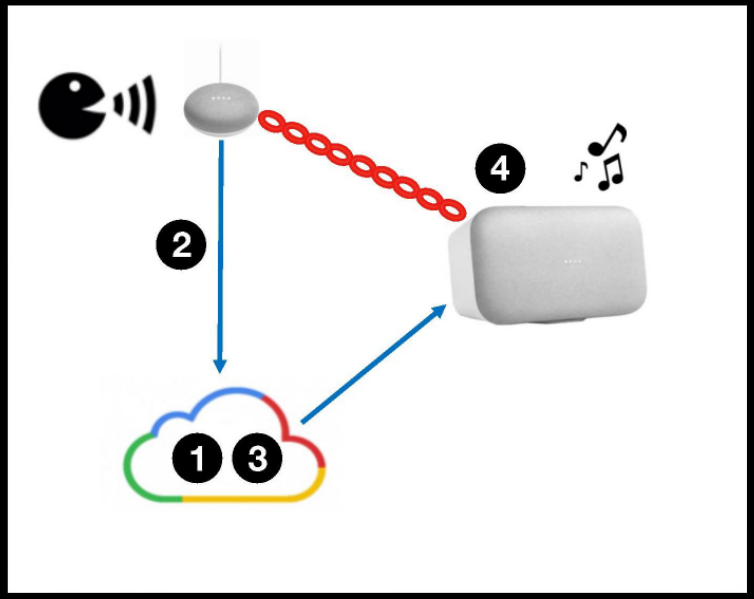
Title: Default playback devices

Priority Date: 2/22/2016

Issue Date: 11/14/2017

This patent involves a computing device:

1. Maintaining database of network microphone device and playback device assignments.
2. Receiving from a network microphone device a voice input with a media playback command.
3. Determining that voice input did not indicate output playback device, and identifying a particular playback device assigned to the network microphone device.
4. Transmitting a message to the particular playback device to execute the media playback command.



Default playback devices

U.S. Patent No. 9,820,039; 2/22/2016

1. A computing device … to perform functions comprising:

maintaining …data indicating an assignment of an identification of a network microphone device to a particular playback zone of a media playback system, wherein the particular playback zone comprises at least one playback device;

receiving from the network microphone device, data indicating a voice input comprising a media playback command;

determining that the voice input does not comprise an indication of any playback zone in the media playback system;

in response to determining that the voice input does not comprise an indication of any playback zone in the media playback system, identifying … the particular playback zone in the media playback system based on the data indicating the assignment of the identification of the network microphone device to the particular playback zone; and

…, transmitting to the at least one playback device of the particular playback zone, a message indicating the media playback command to cause the at least one playback device of the particular playback zone to execute the media playback command.

Continuing with the scenario, in which Max 5 is configured as the default output device for Mini 2:

Voice command to Mini 2: "Play all along the watchtower ***on patio 5***"

Resulting Action: "All Along The Watchtower" begins playing on Patio 5 speaker.

Voice command to Mini 2:"play all along the watchtower."

Resulting Action: "All Along The Watchtower" begins playing on Max 5.

* see Claim 1 of U.S. Patent 9,820,039 for complete claim language

US Patent No.: 9,252,721

SONOS

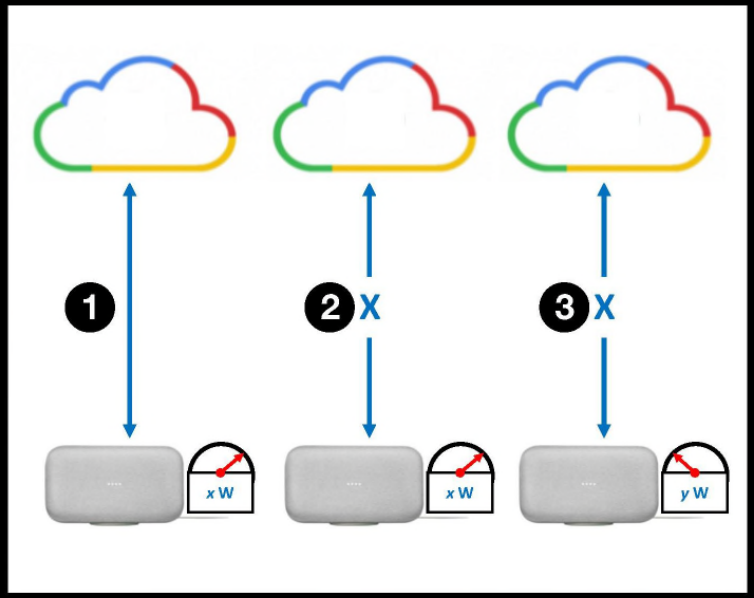
Title: Power decrease based on packet type

Priority Date: 5/15/2004

Issue Date: 2/2/2016

This patent involves a playback device:

1. While operating in a first power mode, receive particular packets.
2. Determining that a defined time has passed since the particular packets were received.
3. Transitioning to operate in a second power mode. The first power mode consumes more power than the second power mode.



Power decrease based on packet type

U.S. Patent No. 9,252,721; 5/15/2004

1. A playback device … to:

operate in a first power mode in which the amplifier consumes a first amount of power;

while operating in the first power mode, receive one or more packets addressed to the playback device, and determine that a defined time has passed since receiving a specified type of data packet; and

after determining that the defined time has passed since receiving the specified type of data packet, transition from operating in the first power mode to operate in a second power mode in which the amplifier consumes a second amount of power, wherein the first amount of power is greater than the second amount of power.

The amplifier in Google Home Max consumes a first wattage when a Cast session is established, and is playing or ready to play audio.

* see Claim 1 of U.S. Patent 9,252,721 for complete claim language

Power decrease based on packet type

U.S. Patent No. 9,252,721; 5/15/2004

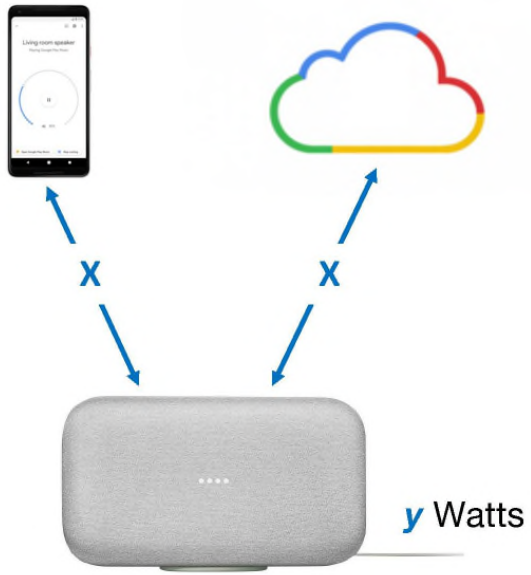
1. A playback device … to:

operate in a first power mode in which the amplifier consumes a first amount of power;

while operating in the first power mode, receive one or more packets addressed to the playback device, and determine that a defined time has passed since receiving a specified type of data packet; and

after determining that the defined time has passed since receiving the specified type of data packet, transition from operating in the first power mode to operate in a second power mode in which the amplifier consumes a second amount of power, wherein the first amount of power is greater than the second amount of power.

The amplifier in Google Home Max begins consuming a second wattage when a duration of time has passed after the Cast session is terminated.



* see Claim 1 of U.S. Patent 9,252,721 for complete claim language

Power decrease based on packet type

U.S. Patent No. 9,252,721; 5/15/2004

1. A playback device … to:

operate in a first power mode in which the amplifier consumes a first amount of power;

while operating in the first power mode, receive one or more packets addressed to the playback device, and determine that a defined time has passed since receiving a specified type of data packet; and

after determining that the defined time has passed since receiving the specified type of data packet, transition from operating in the first power mode to operate in a second power mode in which the amplifier consumes a second amount of power, wherein the first amount of power is greater than the second amount of power.

x Watts **>** ***y*** Watts

* see Claim 1 of U.S. Patent 9,252,721 for complete claim language

US Patent No.: 9,219,959; 90/013,756

In Litigation | Re-Examined

SONOS

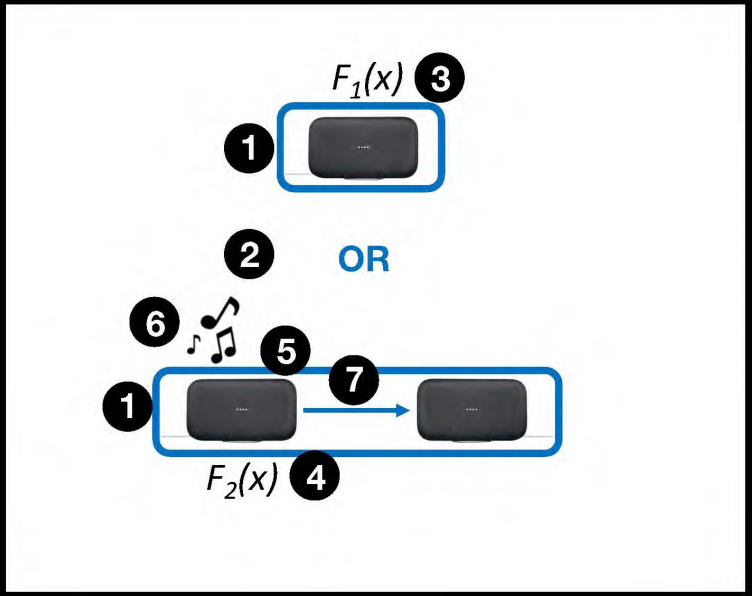
Title: Multi-channel pairing in a media system

Priority Date: 1/25/2011

Issue Date: 12/22/2015; 4/5/2017

This patent involves a playback device:

1. Processing audio data before output.
2. Determining a type of pairing of the playback device.
3. Configuring playback device to perform first EQ if first type of pairing.
4. Configuring playback device perform second EQ if second type of pairing.
5. Separating the audio into separate channels.
6. Outputting at least one channel.
7. Transmitting at least one additional separate channel.



Multi-channel pairing in a media system

U.S. Patent No. 9,219,959 (90/013,756); 1/25/2011

In Litigation | Re-Examined

9. A playback device configured to…:

(i) process the audio data before the playback device outputs audio from the plurality of speaker drivers,

(ii) determine that a type of pairing of the playback device comprises one of at least a first type of pairing or a second type of pairing,

(iii) configure the playback device to perform a first equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the first type of pairing,

(iv) configure the playback device to perform a second equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the second type of pairing,

(v) separate the audio data into separate audio channels,

(vi) output audio based on audio data of at least one separate audio channel from the plurality of speaker drivers, and

(vii) transmit at least one additional separate audio channel over the network.

* see claim 9 of U.S. Patent 9,219,959 for complete claim language

Google Home Max receives audio data and processes the audio data before outputting audio.

Multi-channel pairing in a media system

U.S. Patent No. 9,219,959 (90/013,756); 1/25/2011

In Litigation | Re-Examined

9. A playback device configured to…:

(i) process the audio data before the playback device outputs audio from the plurality of speaker drivers,

(ii) determine that a type of pairing of the playback device comprises one of at least a first type of pairing or a second type of pairing,

(iii) configure the playback device to perform a first equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the first type of pairing,

(iv) configure the playback device to perform a second equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the second type of pairing,

(v) separate the audio data into separate audio channels,

(vi) output audio based on audio data of at least one separate audio channel from the plurality of speaker drivers, and

(vii) transmit at least one additional separate audio channel over the network.

OR

* see claim 9 of U.S. Patent 9,219,959 for complete claim language

Multi-channel pairing in a media system

U.S. Patent No. 9,219,959 (90/013,756); 1/25/2011

In Litigation | Re-Examined

9. A playback device configured to…:

(i) process the audio data before the playback device outputs audio from the plurality of speaker drivers,

(ii) determine that a type of pairing of the playback device comprises one of at least a first type of pairing or a second type of pairing,

(iii) configure the playback device to perform a first equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the first type of pairing,

(iv) configure the playback device to perform a second equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the second type of pairing,

(v) separate the audio data into separate audio channels,

(vi) output audio based on audio data of at least one separate audio channel from the plurality of speaker drivers, and

(vii) transmit at least one additional separate audio channel over the network.

* see claim 9 of U.S. Patent 9,219,959 for complete claim language

In the first type of pairing, Max performs a first equalization before outputting audio.

Multi-channel pairing in a media system

U.S. Patent No. 9,219,959 (90/013,756); 1/25/2011

In Litigation | Re-Examined

9. A playback device configured to…:

(i) process the audio data before the playback device outputs audio from the plurality of speaker drivers,

(ii) determine that a type of pairing of the playback device comprises one of at least a first type of pairing or a second type of pairing,

(iii) configure the playback device to perform a first equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the first type of pairing,

(iv) configure the playback device to perform a second equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the second type of pairing,

(v) separate the audio data into separate audio channels,

(vi) output audio based on audio data of at least one separate audio channel from the plurality of speaker drivers, and

(vii) transmit at least one additional separate audio channel over the network.

* see claim 9 of U.S. Patent 9,219,959 for complete claim language

In the second type of pairing, Max performs a second equalization before outputting audio.

Multi-channel pairing in a media system

U.S. Patent No. 9,219,959 (90/013,756); 1/25/2011

In Litigation | Re-Examined

9. A playback device configured to…:

(i) process the audio data before the playback device outputs audio from the plurality of speaker drivers,

(ii) determine that a type of pairing of the playback device comprises one of at least a first type of pairing or a second type of pairing,

(iii) configure the playback device to perform a first equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the first type of pairing,

(iv) configure the playback device to perform a second equalization of the audio data before outputting audio based on the audio data from the plurality of speaker drivers when the type of pairing is determined to comprise the second type of pairing,

(v) separate the audio data into separate audio channels,

(vi) output audio based on audio data of at least one separate audio channel from the plurality of speaker drivers, and

(vii) transmit at least one additional separate audio channel over the network.

* see claim 9 of U.S. Patent 9,219,959 for complete claim language

Max separates the audio data into separate channels, outputs one of the channels, and transmits at least one of the other channels to another Max.

US Patent No.: 9,202,509; 90/013,859

In Litigation | Re-Examined

SONOS

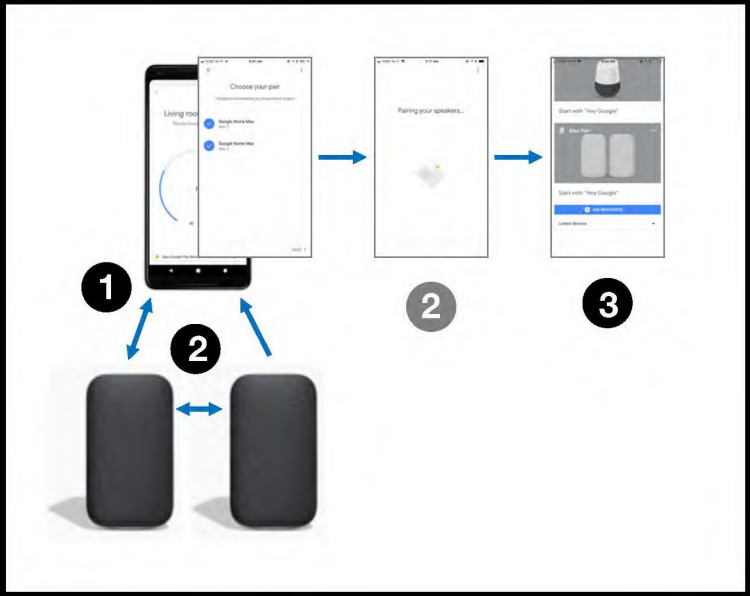
Title: Controlling and grouping in a multi-zone media system

Priority Date: 1/25/2011

Issue Date: 12/1/2015; 5/30/2017

This patent involves a controller device:

1. Identifying a plurality of playback devices on a LAN.
2. Instructing at least a first playback device of the plurality to request audio stream and split the stream into a first and second channel, wherein the first playback device is configured to play the first channel and a second playback device in the plurality is configured to play the second channel.
3. Displaying an indication that each of the playback devices are configured to produce a respective channel.



Controlling and grouping in a multi-zone media system

U.S. Patent No. 9,202,509 (90/013,859); 1/25/2011

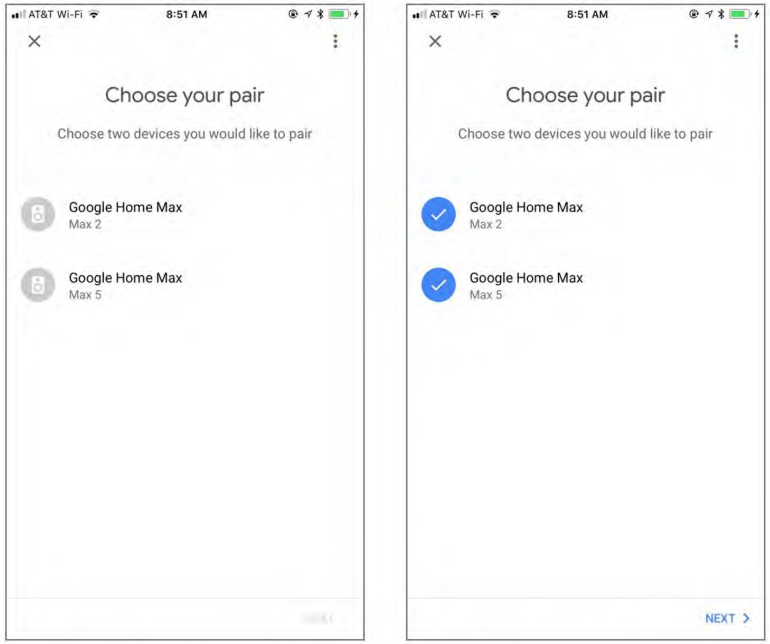
In Litigation | Re-Examined

1. A method comprising:

identifying, via a controller, a plurality of playback devices on a local area network (LAN), …;

instructing, via the controller over the LAN, at least one of the plurality of playback devices to process the requested audio data stream into at least one of a first and a second channel of the requested audio data stream and to reproduce a respective one of the first and the second channel, …, such that a first playback device in [a] group of the plurality of playback devices is configured as part of the group to reproduce the first channel of the requested audio data stream for the group and a second playback device in the group … is configured as part of the group to reproduce the second channel of the requested audio data stream for the group; and

displaying, via the controller, an indication that each of the plurality of playback devices is configured to reproduce a respective channel.



When initiating stereo pair, the Google Home application identifies devices on the network that are available for pairing.

* see claim 1 of U.S. Patent 9,202,509 for complete claim language

Controlling and grouping in a multi-zone media system

U.S. Patent No. 9,202,509 (90/013,859); 1/25/2011

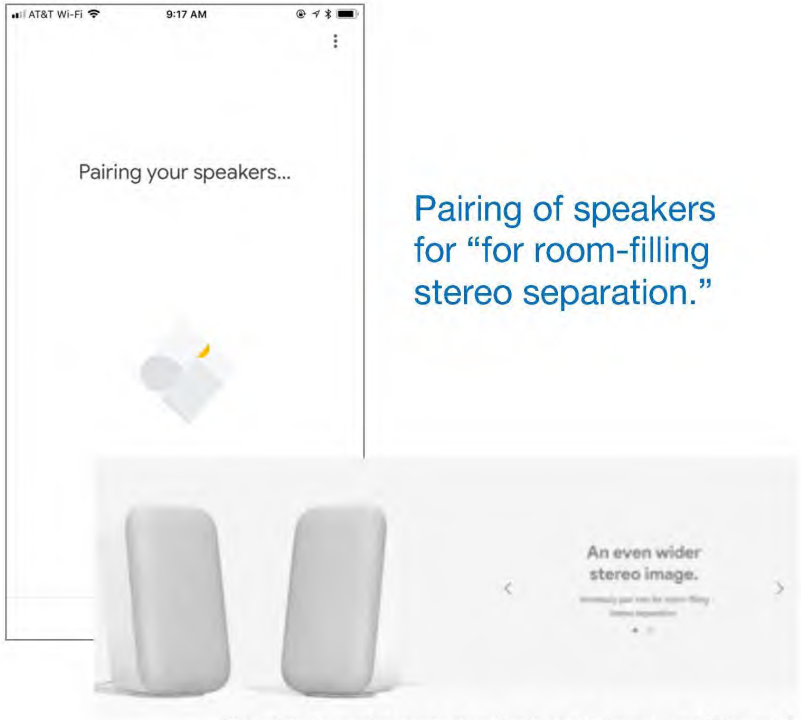
In Litigation | Re-Examined

1. A method comprising:

identifying, via a controller, a plurality of playback devices on a local area network (LAN), …;

instructing, via the controller over the LAN, at least one of the plurality of playback devices to process the requested audio data stream into at least one of a first and a second channel of the requested audio data stream and to reproduce a respective one of the first and the second channel, …, such that a first playback device in [a] group of the plurality of playback devices is configured as part of the group to reproduce the first channel of the requested audio data stream for the group and a second playback device in the group … is configured as part of the group to reproduce the second channel of the requested audio data stream for the group; and

displaying, via the controller, an indication that each of the plurality of playback devices is configured to reproduce a respective channel.



Pairing of speakers for "for room-filling stereo separation."

https://store.google.com/us/product/google_home_max?hl=en-US

* see claim 1 of U.S. Patent 9,202,509 for complete claim language

Controlling and grouping in a multi-zone media system

U.S. Patent No. 9,202,509 (90/013,859); 1/25/2011

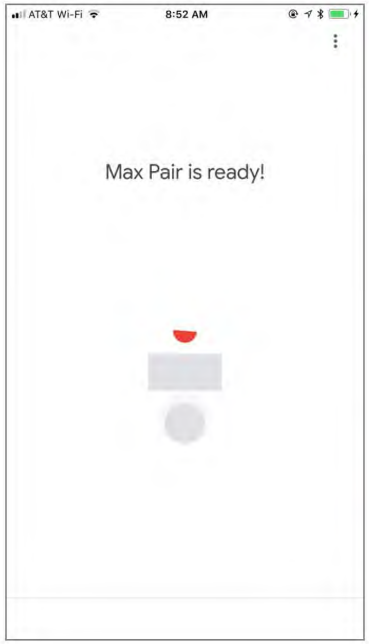
In Litigation Re-Examined

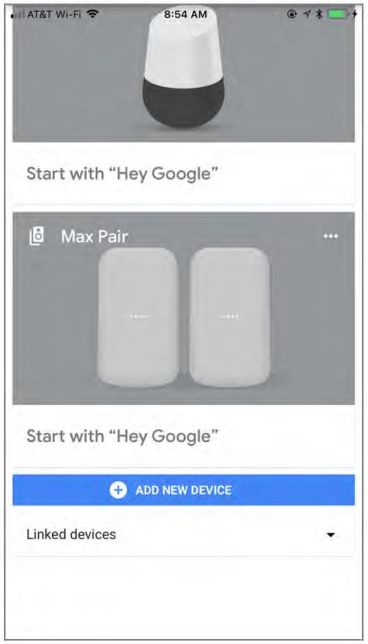
1. A method comprising:

identifying, via a controller, a plurality of playback devices on a local area network (LAN), …;

instructing, via the controller over the LAN, at least one of the plurality of playback devices to process the requested audio data stream into at least one of a first and a second channel of the requested audio data stream and to reproduce a respective one of the first and the second channel, …, such that a first playback device in [a] group of the plurality of playback devices is configured as part of the group to reproduce the first channel of the requested audio data stream for the group and a second playback device in the group … is configured as part of the group to reproduce the second channel of the requested audio data stream for the group; and

displaying, via the controller, an indication that each of the plurality of playback devices is configured to reproduce a respective channel.





* see claim 1 of U.S. Patent 9,202,509 for complete claim language

US Patent Application No.: 15/228,685 (Allowed)

SONOS

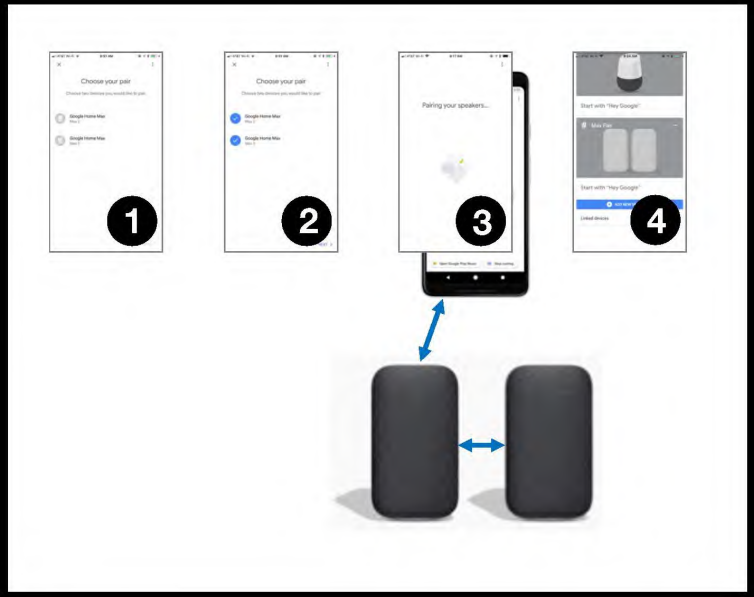
Title: Making and indicating a stereo pair

Priority Date: 1/25/2011

Issue Date: N/A

This patent involves a controller device:

1. Displaying an identification (name) of two or more playback devices in a system.
2. Receiving a selection to make a stereo pair of two of the playback devices.
3. Instructing the two playback devices to be configured for playback according to a stereo sound effect.
4. Causing display a name for the stereo pair of the two playback devices.



Making and indicating a stereo pair

U.S. Patent App No. 15/228,685 (allowed); 1/25/2011

1. A method comprising:

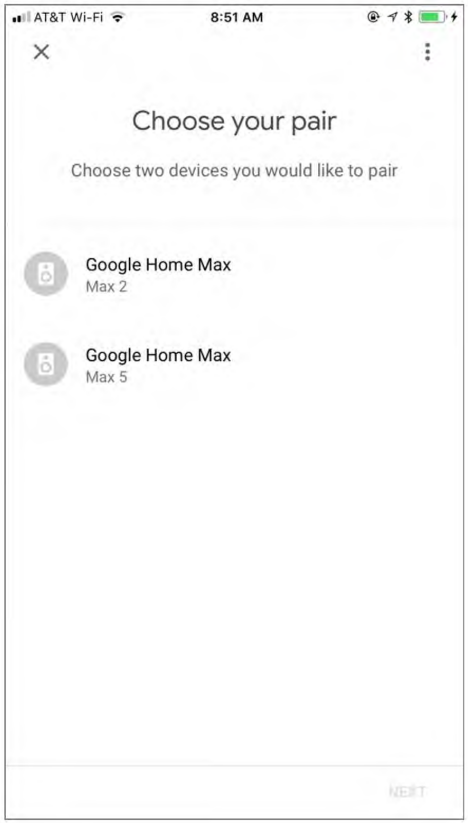
causing, via a controller, a graphical display to display an identification of two or more playback devices in a system, wherein the identification comprises a first name of a first playback device and a second name of a second playback device;

receiving, via the controller, a selection to make a stereo pair of the first playback device and the second playback device;

after receiving the selection to make the stereo pair of the first playback device and the second playback device:

instructing, via the controller over a data network, at least one of the first playback device and the second playback device to be configured for playback according to a stereo sound effect; and

causing, via the controller, the graphical display to display a name for the stereo pair of the first playback device and the second playback device.



Making and indicating a stereo pair

U.S. Patent App No. 15/228,685 (allowed); 1/25/2011

1. A method comprising:

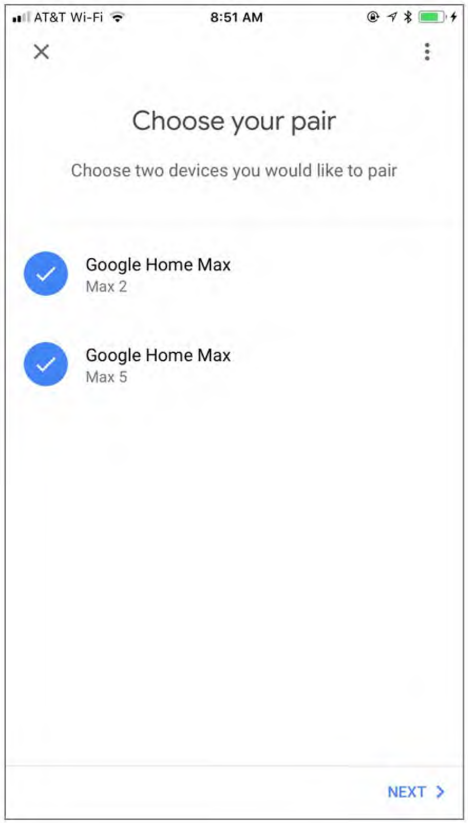
causing, via a controller, a graphical display to display an identification of two or more playback devices in a system, wherein the identification comprises a first name of a first playback device and a second name of a second playback device;

receiving, via the controller, a selection to make a stereo pair of the first playback device and the second playback device;

after receiving the selection to make the stereo pair of the first playback device and the second playback device:

instructing, via the controller over a data network, at least one of the first playback device and the second playback device to be configured for playback according to a stereo sound effect; and

causing, via the controller, the graphical display to display a name for the stereo pair of the first playback device and the second playback device.



Making and indicating a stereo pair

U.S. Patent App No. 15/228,685 (allowed); 1/25/2011

1. A method comprising:

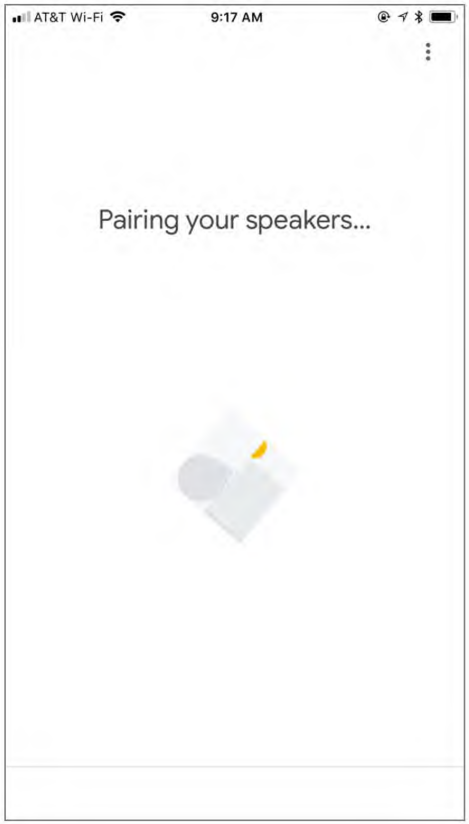
causing, via a controller, a graphical display to display an identification of two or more playback devices in a system, wherein the identification comprises a first name of a first playback device and a second name of a second playback device;

receiving, via the controller, a selection to make a stereo pair of the first playback device and the second playback device;

after receiving the selection to make the stereo pair of the first playback device and the second playback device:

instructing, via the controller over a data network, at least one of the first playback device and the second playback device to be configured for playback according to a stereo sound effect; and

causing, via the controller, the graphical display to display a name for the stereo pair of the first playback device and the second playback device.



Making and indicating a stereo pair

U.S. Patent App No. 15/228,685 (allowed); 1/25/2011

1. A method comprising:

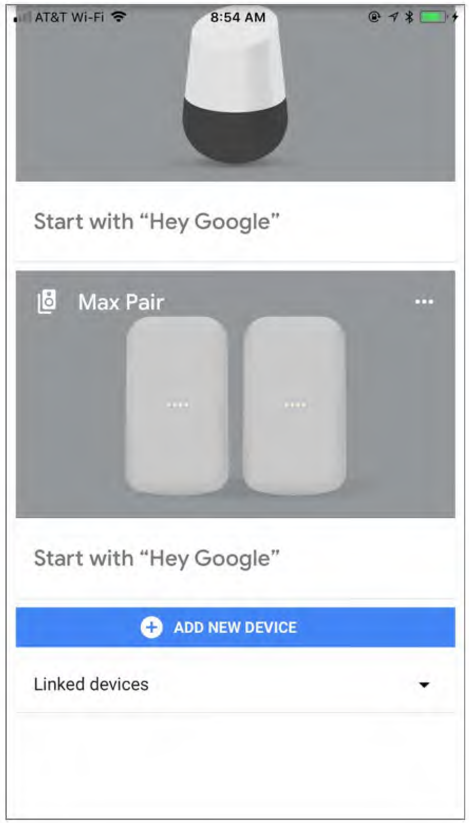
causing, via a controller, a graphical display to display an identification of two or more playback devices in a system, wherein the identification comprises a first name of a first playback device and a second name of a second playback device;

receiving, via the controller, a selection to make a stereo pair of the first playback device and the second playback device;

after receiving the selection to make the stereo pair of the first playback device and the second playback device:

instructing, via the controller over a data network, at least one of the first playback device and the second playback device to be configured for playback according to a stereo sound effect; and

causing, via the controller, the graphical display to display a name for the stereo pair of the first playback device and the second playback device.



US Patent No.: 9,042,556

SONOS

Title: Shaping sound responsive to speaker orientation

Priority Date: 7/19/2011

Issue Date: 5/26/2015

This patent involves a playback device:

1. Receiving audio data.
2. Determining an orientation and configuration state.
3. Shaping sound output to reproduce one of (a) first set of one or more channels or (b) a first frequency range based on first orientation and the configuration state.
4. Shaping sound output to reproduce one of (a) a second set of one or more channels or (b) a second frequency range based on second orientation and the configuration state.

Shaping sound responsive to speaker orientation

U.S. Patent No. 9,042,556; 7/19/2011

1. A method for shaping sound, the method comprising:
receiving an audio data stream by a playback device;
determining an orientation and a configuration state of the playback device;
shaping sound output from a speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a first set of one or more channels or (b) a first range of frequencies based on a first orientation and the configuration state; and
shaping sound output from the speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a second set of one or more channels or (b) a second range of frequencies based on a second orientation and the configuration state, wherein the configuration state comprises any of: not paired, not grouped, …, a pairing between the playback device and an additional playback device, a grouping of the playback device with an additional playback device, ….

Google Home Max receives audio data stream

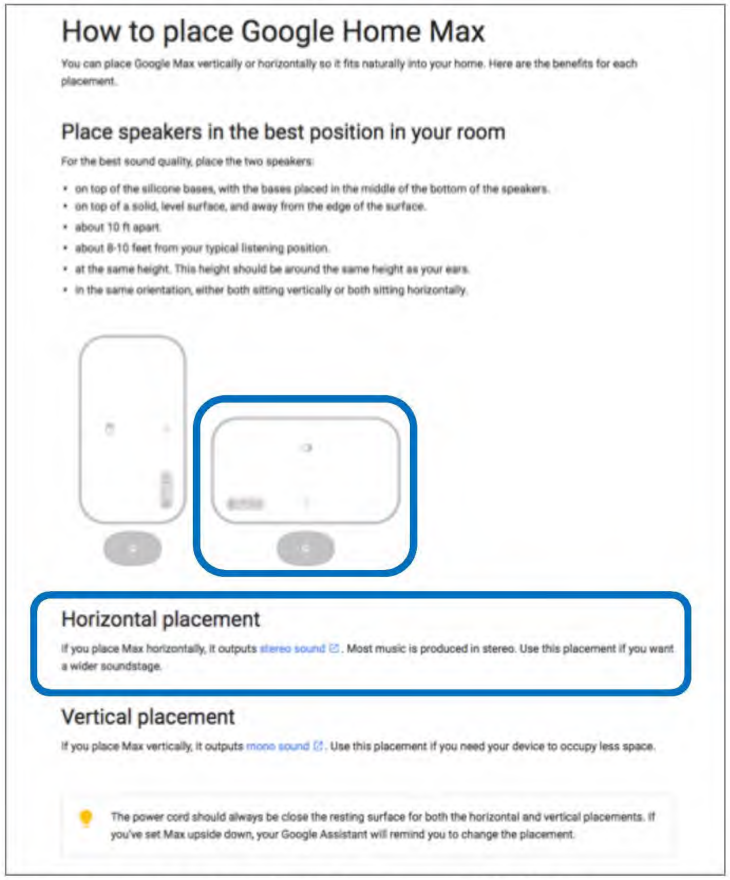
* see claim 1 of U.S. Patent 9,042,556 for complete claim language

Shaping sound responsive to speaker orientation

U.S. Patent No. 9,042,556; 7/19/2011

1. A method for shaping sound, the method comprising:
receiving an audio data stream by a playback device;
determining an orientation and a configuration state of the playback device;
shaping sound output from a speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a first set of one or more channels or (b) a first range of frequencies based on a first orientation and the configuration state; and
shaping sound output from the speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a second set of one or more channels or (b) a second range of frequencies based on a second orientation and the configuration state, wherein the configuration state comprises any of: not paired, not grouped, …, a pairing between the playback device and an additional playback device, a grouping of the playback device with an additional playback device, ….

* see claim 1 of U.S. Patent 9,042,556 for complete claim language

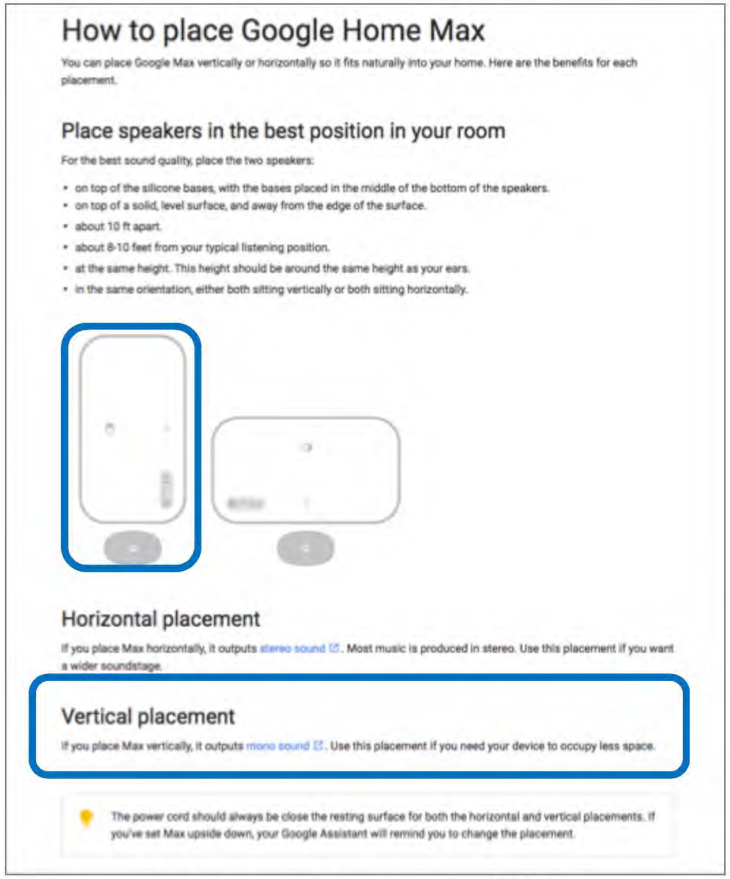


* https://support.google.com/googlehome/answer/7584544?hl=en

Shaping sound responsive to speaker orientation

U.S. Patent No. 9,042,556; 7/19/2011

1. A method for shaping sound, the method comprising:
receiving an audio data stream by a playback device;
determining an orientation and a configuration state of the playback device;
shaping sound output from a speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a first set of one or more channels or (b) a first range of frequencies based on a first orientation and the configuration state; and
shaping sound output from the speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a second set of one or more channels or (b) a second range of frequencies based on a second orientation and the configuration state, wherein the configuration state comprises any of: not paired, not grouped, …, a pairing between the playback device and an additional playback device, a grouping of the playback device with an additional playback device, ….



* see claim 1 of U.S. Patent 9,042,556 for complete claim language

* https://support.google.com/googlehome/answer/7584544?hl=en

Shaping sound responsive to speaker orientation

U.S. Patent No. 9,042,556; 7/19/2011

1. A method for shaping sound, the method comprising:
receiving an audio data stream by a playback device;
determining an orientation and a configuration state of the playback device;
shaping sound output from a speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a first set of one or more channels or (b) a first range of frequencies based on a first orientation and the configuration state; and
shaping sound output from the speaker transducer of the playback device using the audio data stream to reproduce at least one of (a) a second set of one or more channels or (b) a second range of frequencies based on a second orientation and the configuration state, wherein the configuration state comprises any of: not paired, not grouped, …, a pairing between the playback device and an additional playback device, a grouping of the playback device with an additional playback device, ….

A Google Home Max can operate in configuration states including:
- an individual device by itself
- an individual device in a group
- part of a stereo pair
- part of a stereo pair in a group

A Google Home Max can be in a vertical or horizontal orientation for any of these configuration states.

Based on the combinations of orientations and configuration states, a Google Home Max will reproduce different one or more channels and/or different range of frequencies.

* see claim 1 of U.S. Patent 9,042,556 for complete claim language

US Patent No.: 9,748,647

SONOS

Title: Frequency routing based on orientation

Priority Date: 7/19/2011

Issue Date: 8/29/2017

This patent involves a playback device:

1. Receiving audio data.
2. Determining a change in orientation.
3. Routing a first set of frequencies to speaker drivers when in a first orientation.
4. Routing a second set of frequencies to speaker drivers when in a second orientation.

Frequency routing based on orientation

U.S. Patent No. 9,748,647; 7/19/2011

1. A playback device … to perform functions comprising:
receiving an audio data stream …;
determining, via the at least one orientation sensor, a change in orientation of the playback device from a first orientation to a second orientation, wherein the determining includes (i) detecting for a change in pitch relative to a pitch axis of the playback device and (ii) detecting for a change in roll relative to a roll axis of the playback device, …;
routing a first set of frequencies in the audio data stream to at least one of the plurality of speaker drivers when the playback device is in the first orientation; and
routing a second set of frequencies in the audio data stream to the at least one of the plurality of speaker drivers when the playback device is determined to be in the second orientation, wherein the first set of frequencies is different than the second set of frequencies.

Google Home Max receives audio data stream

* see claim 1 of U.S. Patent 9,748,647 for complete claim language

Frequency routing based on orientation

U.S. Patent No. 9,748,647; 7/19/2011

1. A playback device … to perform functions comprising:
receiving an audio data stream …;
determining, via the at least one orientation sensor, a change in orientation of the playback device from a first orientation to a second orientation, wherein the determining includes (i) detecting for a change in pitch relative to a pitch axis of the playback device and (ii) detecting for a change in roll relative to a roll axis of the playback device, …;
routing a first set of frequencies in the audio data stream to at least one of the plurality of speaker drivers when the playback device is in the first orientation; and
routing a second set of frequencies in the audio data stream to the at least one of the plurality of speaker drivers when the playback device is determined to be in the second orientation, wherein the first set of frequencies is different than the second set of frequencies.

"When you prop the speaker [vertically], an ***internal orientation sensor*** recognizes that and switches to mono playback" – Android Police,January 4, 2018[1]

"In horizontal mode, the Max provides stereo sound, but if you turn it to vertical, it will switch to mono output. An ***internal orientation sensor*** handles the switch automatically" – The Verge, December 20, 2017[2]

"[Y]ou'll only get stereo sound in horizontal orientation…. [T]urn it vertically and it will stich over to mono. There's ***an orientation sensor on the inside*** that does this all automatically" – Pocket-Lint, January 18, 2018[3]

* see claim 1 of U.S. Patent 9,748,647 for complete claim language

[1] http://www.androidpolice.com/2018/01/04/google-home-max-review-best-expensive-smart-speaker/
[2] https://www.theverge.com/2017/12/20/16797728/google-home-max-smart-speaker-assistant-review
[3] https://www.pocket-lint.com/smart-home/reviews/google/143184-google-home-max-review-turning-smart-home-sound-quality-up-to-11

Frequency routing based on orientation

U.S. Patent No. 9,748,647; 7/19/2011

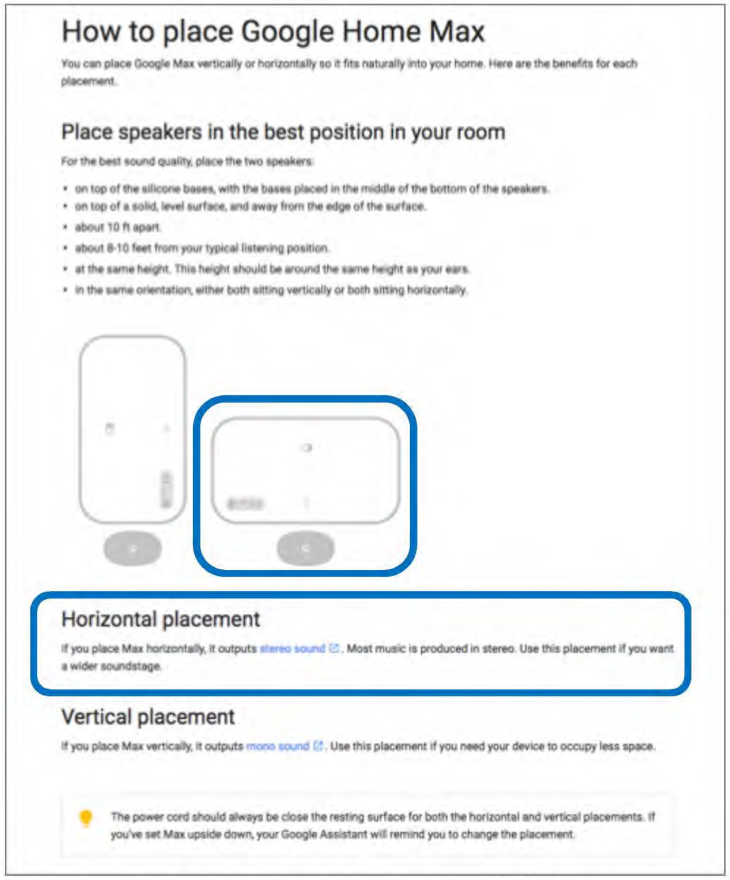
1. A playback device … to perform functions comprising:

receiving an audio data stream …;

determining, via the at least one orientation sensor, a change in orientation of the playback device from a first orientation to a second orientation, wherein the determining includes (i) detecting for a change in pitch relative to a pitch axis of the playback device and (ii) detecting for a change in roll relative to a roll axis of the playback device, …;

routing a first set of frequencies in the audio data stream to at least one of the plurality of speaker drivers when the playback device is in the first orientation; and

routing a second set of frequencies in the audio data stream to the at least one of the plurality of speaker drivers when the playback device is determined to be in the second orientation, wherein the first set of frequencies is different than the second set of frequencies.



* see claim 1 of U.S. Patent 9,748,647 for complete claim language

* https://support.google.com/googlehome/answer/7584544?hl=en

Frequency routing based on orientation

U.S. Patent No. 9,748,647; 7/19/2011

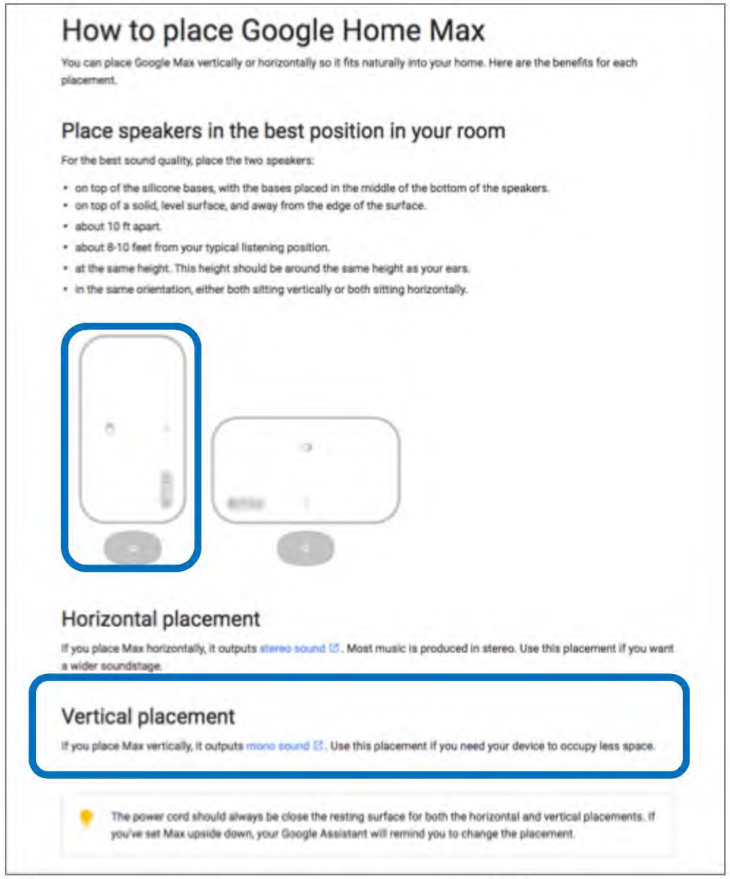
1. A playback device … to perform functions comprising:

receiving an audio data stream …;

determining, via the at least one orientation sensor, a change in orientation of the playback device from a first orientation to a second orientation, wherein the determining includes (i) detecting for a change in pitch relative to a pitch axis of the playback device and (ii) detecting for a change in roll relative to a roll axis of the playback device, …;

routing a first set of frequencies in the audio data stream to at least one of the plurality of speaker drivers when the playback device is in the first orientation; and

routing a second set of frequencies in the audio data stream to the at least one of the plurality of speaker drivers when the playback device is determined to be in the second orientation, wherein the first set of frequencies is different than the second set of frequencies.



* see claim 1 of U.S. Patent 9,748,647 for complete claim language

* https://support.google.com/googlehome/answer/7584544?hl=en

US Patent No.: 9,671,780

SONOS

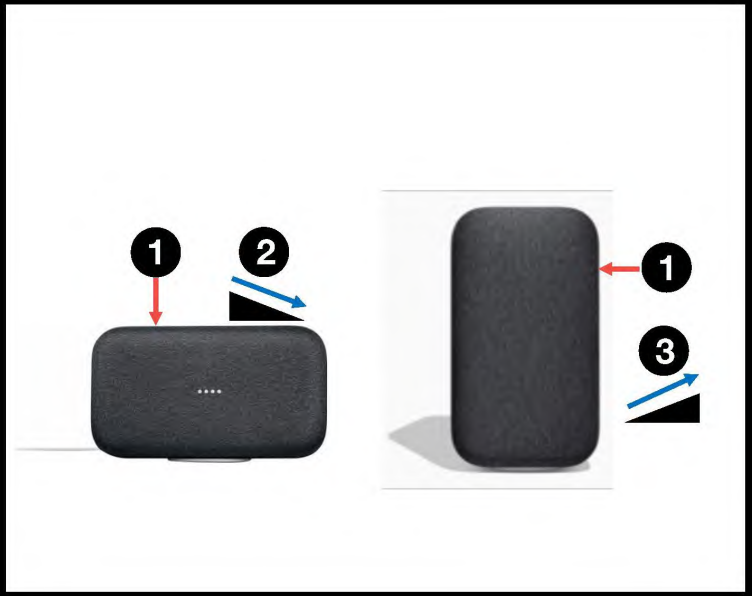
Title: Playback device control

Priority Date: 9/29/2014

Issue Date: 6/6/2017

This patent involves a playback device:

1. While in a given playback state, receiving a physical contact at a given location on the playback device.
2. If playback device is in a first orientation, perform a first playback action.
3. If playback device is in a second orientation, perform a second playback action.



Playback device control

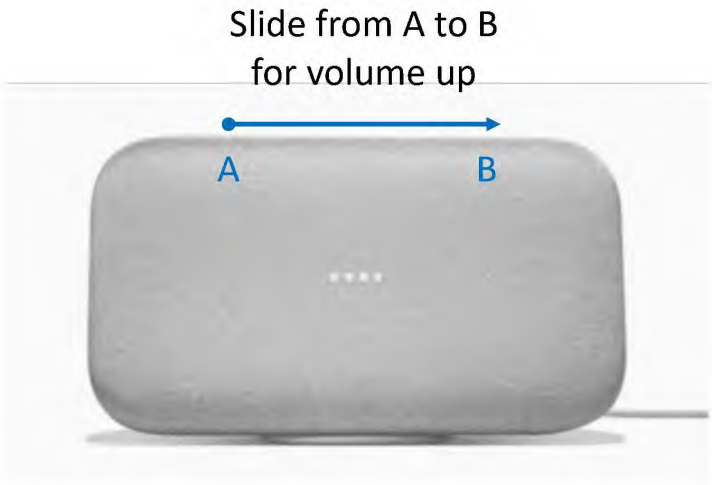
U.S. Patent No. 9,671,780; 9/29/2014

1. A playback device … to perform functions comprising:

while in [a] given playback state, receiving, via the array of proximity sensors, location data indicating a physical contact at a given location on [a] array of proximity sensors;

in response to receiving the location data: if orientation data from the orientation sensor indicates that the enclosure is in a first orientation, causing the playback device to perform a first playback action that changes the given playback state of the playback device, the first playback action corresponding to (i) physical contact at the given location …, (ii) the first orientation, and (iii) the given playback state; and

if orientation data from the orientation sensor indicates that the enclosure is in a second orientation, causing the playback device to perform a second playback action that changes the given playback state of the playback device, the second playback action corresponding to (i) physical contact at the given location …, (ii) the second orientation, and (iii) the given playback state, wherein the second playback action is different from the first playback action.



* see claim 1 of U.S. Patent 9,671,780 for complete claim language

Playback device control

U.S. Patent No. 9,671,780; 9/29/2014

1. A playback device … to perform functions comprising:

while in [a] given playback state, receiving, via the array of proximity sensors, location data indicating a physical contact at a given location on [a] array of proximity sensors;

in response to receiving the location data: if orientation data from the orientation sensor indicates that the enclosure is in a first orientation, causing the playback device to perform a first playback action that changes the given playback state of the playback device, the first playback action corresponding to (i) physical contact at the given location …, (ii) the first orientation, and (iii) the given playback state; and

if orientation data from the orientation sensor indicates that the enclosure is in a second orientation, causing the playback device to perform a second playback action that changes the given playback state of the playback device, the second playback action corresponding to (i) physical contact at the given location …, (ii) the second orientation, and (iii) the given playback state, wherein the second playback action is different from the first playback action.

Slide from A to B for volume down

* see claim 1 of U.S. Patent 9,671,780 for complete claim language

US Patent No.: 9,367,611

SONOS

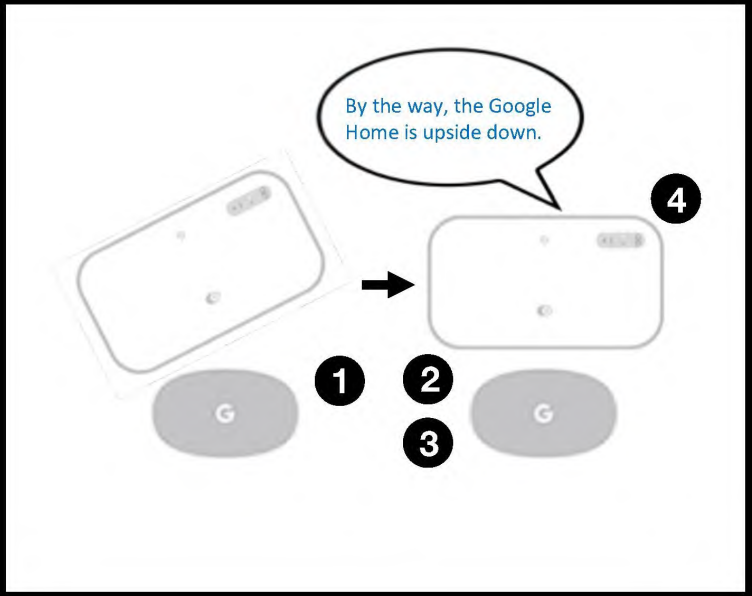
Title: Detecting improper position of a playback device

Priority Date: 7/22/2014

Issue Date: 6/14/2016

This patent involves a playback device:

1. Detecting its position relative to a base.
2. Detecting its orientation.
3. Determining that the detected position does not match reference position for the orientation.
4. Providing an indication that the playback device is improperly position.



Confidential SONOS-SVG2-00043273

Detecting improper position of a playback device

U.S. Patent No. 9,367,611; 7/22/2014

1. A method comprising:

detecting a position of a playback device with respect to a base;

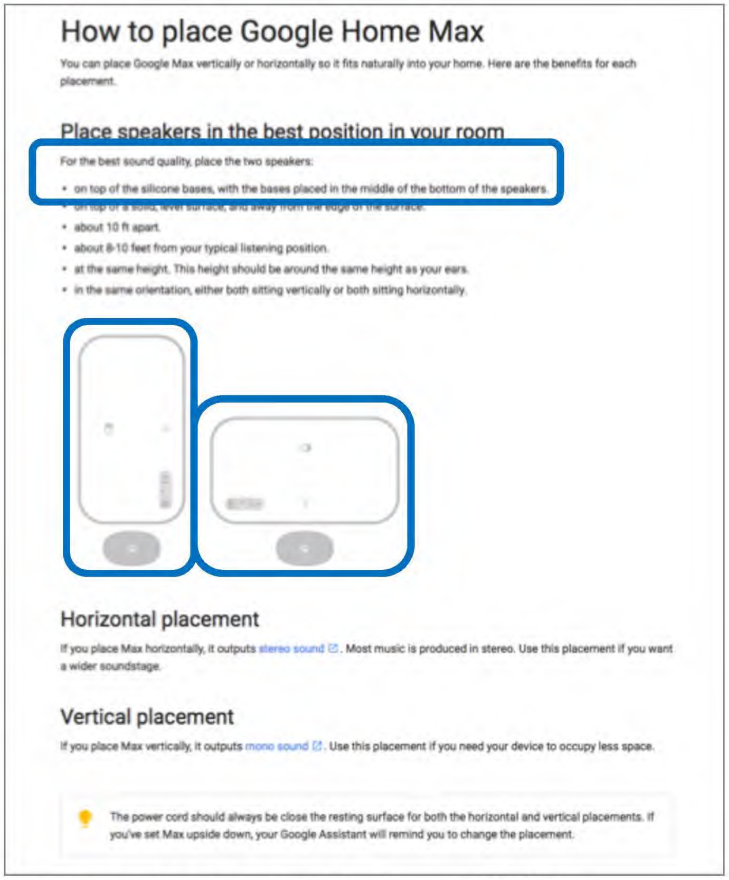
detecting an orientation of the playback device;

determining that the detected position does not match a reference position for the detected orientation; and

responsively, providing an indication that the playback device is improperly positioned.

"The Home Max comes with a [magnetic] base mounted to the bottom of the speaker, but that's not necessarily the bottom. The Max works in "landscape" or "portrait" mode, so you can peal the rubber base off the bottom and affix it to the right side" – Android Police, January 4, 2018*

* http://www.androidpolice.com/2018/01/04/google-home-max-review-best-expensive-smart-speaker/



How to place Google Home Max

You can place Google Max vertically or horizontally so it fits naturally into your home. Here are the benefits for each placement.

Place speakers in the best position in your room

For the best sound quality, place the two speakers:

- on top of the silicone bases, with the bases placed in the middle of the bottom of the speakers.
- about 10 ft apart.
- about 8-10 feet from your typical listening position.
- at the same height. This height should be around the same height as your ears.
- in the same orientation, either both sitting vertically or both sitting horizontally.

Horizontal placement

If you place Max horizontally, it outputs stereo sound. Most music is produced in stereo. Use this placement if you want a wider soundstage.

Vertical placement

If you place Max vertically, it outputs mono sound. Use this placement if you need your device to occupy less space.

The power cord should always be close the resting surface for both the horizontal and vertical placements. If you've set Max upside down, your Google Assistant will remind you to change the placement.

* https://support.google.com/googlehome/answer/7584544?hl=en

Detecting improper position of a playback device

U.S. Patent No. 9,367,611; 7/22/2014

1. A method comprising:

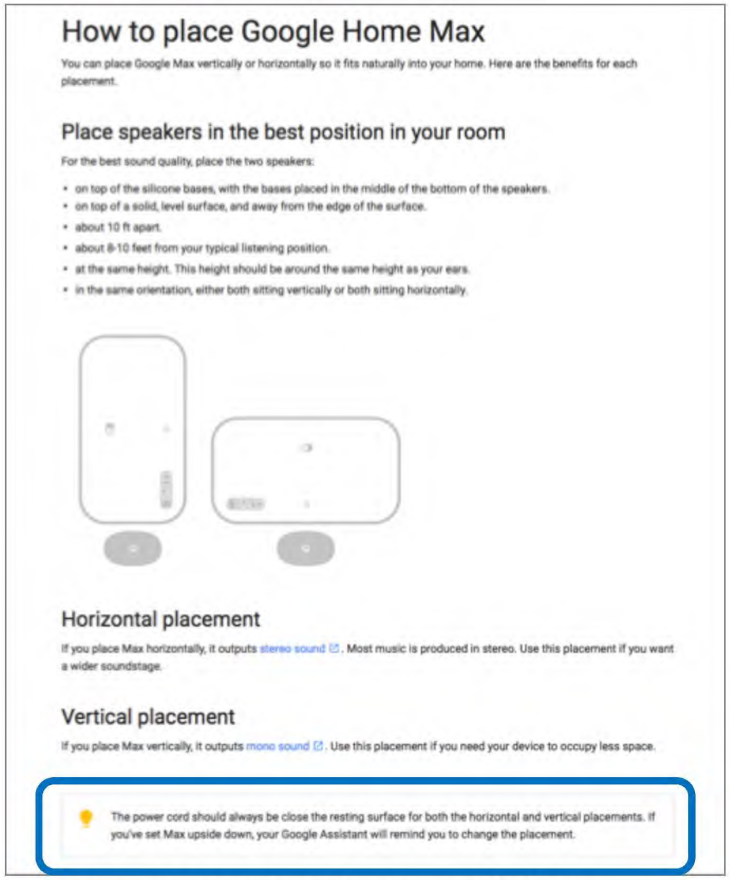
detecting a position of a playback device with respect to a base;

detecting an orientation of the playback device;

determining that the detected position does not match a reference position for the detected orientation; and

responsively, providing an indication that the playback device is improperly positioned.

"An internal orientation sensor handles this switch automatically and it will even tell you if the speaker is placed upside down" – The Verge, December 20, 2017*



* https://www.theverge.com/2017/12/20/16797728/google-home-max-smart-speaker-assistant-review

* https://support.google.com/googlehome/answer/7584544?hl=en

US Patent No.: 9,219,460

SONOS

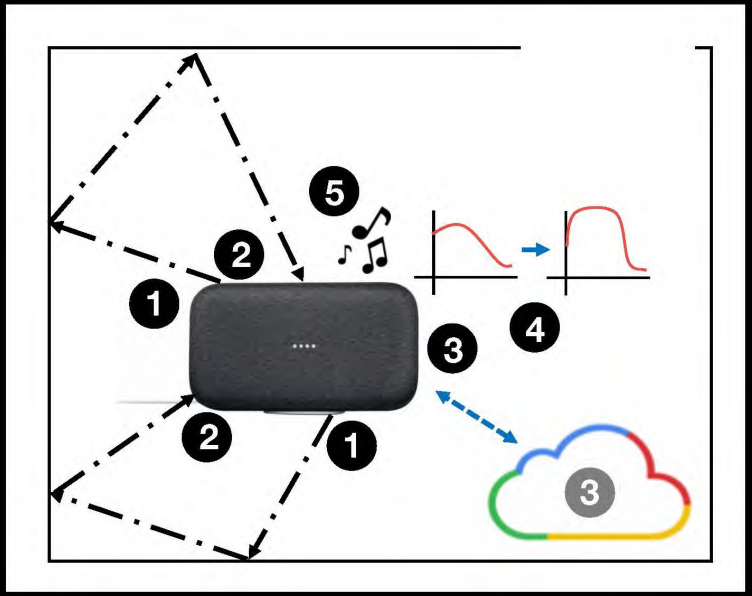
Title: Audio settings based on environment

Priority Date: 3/17/2014

Issue Date: 12/22/2015

This patent involves a playback device:

1. Emitting a first audio signal.
2. Detecting by a microphone of the playback device, a second audio signal comprising a reflection of the first audio signal.
3. Determining reflection characteristics based on the second audio signal.
4. Adjusting an EQ of the playback device based on the reflection characteristics.
5. Causing audio to be played according to the adjusted EQ.



Audio settings based on environment

U.S. Patent No. 9,219,460; 3/17/2014

15. A playback device, comprising:
a speaker;
a microphone that is physically coupled to the speaker;
a processor;
a network interface;
a data storage; and
a program logic stored in the data storage and executable by the processor to:
emit a first audio signal from the speaker;
detect, via the microphone, a second audio signal, wherein at least a portion of the second audio signal is a reflection of the first audio signal;
in response to the detecting, determine a first reflection characteristic based on at least the second audio signal;
adjust an equalization setting of the playback device based on at least the first reflection characteristic; and
play, via the speaker, an audio track according to the equalization setting.

"Hey Google, play some music…. It uses 6 internal microphones to measure the acoustics of your room. Then… it adjusts the equalizer settings…."*

* https://youtu.be/UiBhshQ0FQA

Audio settings based on environment

U.S. Patent No. 9,219,460; 3/17/2014

15. A playback device, comprising:
a speaker;
a microphone that is physically coupled to the speaker;
a processor;
a network interface;
a data storage; and
a program logic stored in the data storage and executable by the processor to:
emit a first audio signal from the speaker;
detect, via the microphone, a second audio signal, wherein at least a portion of the second audio signal is a reflection of the first audio signal;
in response to the detecting, determine a first reflection characteristic based on at least the second audio signal;
adjust an equalization setting of the playback device based on at least the first reflection characteristic; and
play, via the speaker, an audio track according to the equalization setting.

"Hey Google, play some music…. It uses 6 internal microphones to measure the acoustics of your room. Then… it adjusts the equalizer settings…."*

* https://youtu.be/UiBhshQ0FQA

Audio settings based on environment

U.S. Patent No. 9,219,460; 3/17/2014

15. A playback device, comprising:
a speaker;
a microphone that is physically coupled to the speaker;
a processor;
a network interface;
a data storage; and
a program logic stored in the data storage and executable by the processor to:
emit a first audio signal from the speaker;
detect, via the microphone, a second audio signal, wherein at least a portion of the second audio signal is a reflection of the first audio signal;
in response to the detecting, determine a first reflection characteristic based on at least the second audio signal;
adjust an equalization setting of the playback device based on at least the first reflection characteristic; and
play, via the speaker, an audio track according to the equalization setting.

"Hey Google, play some music…. It uses 6 internal microphones to measure the acoustics of your room. Then… it adjusts the equalizer settings…."*

* https://youtu.be/UiBhshQ0FQA

SONOS

US Patent No.: D768,602

Title: Playback device

Priority Date: 4/25/2015

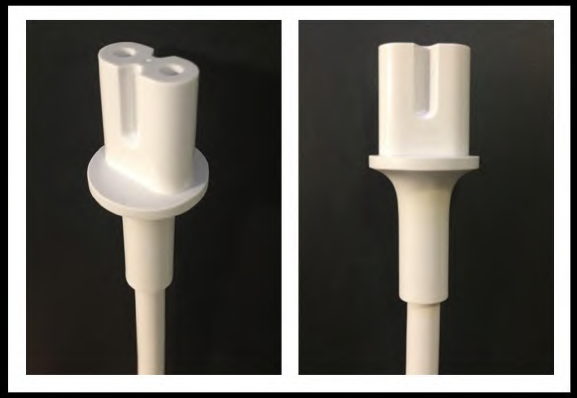
Issue Date: 10/11/2016

US Patent No.: D796,447

Title: Power plug

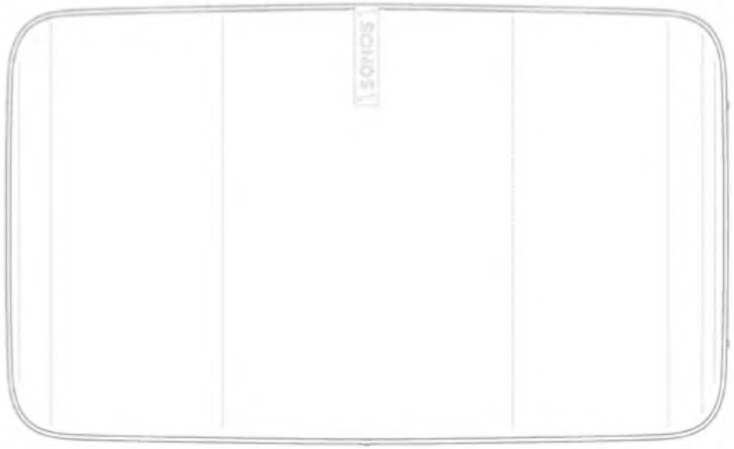
Priority Date: 4/8/2015

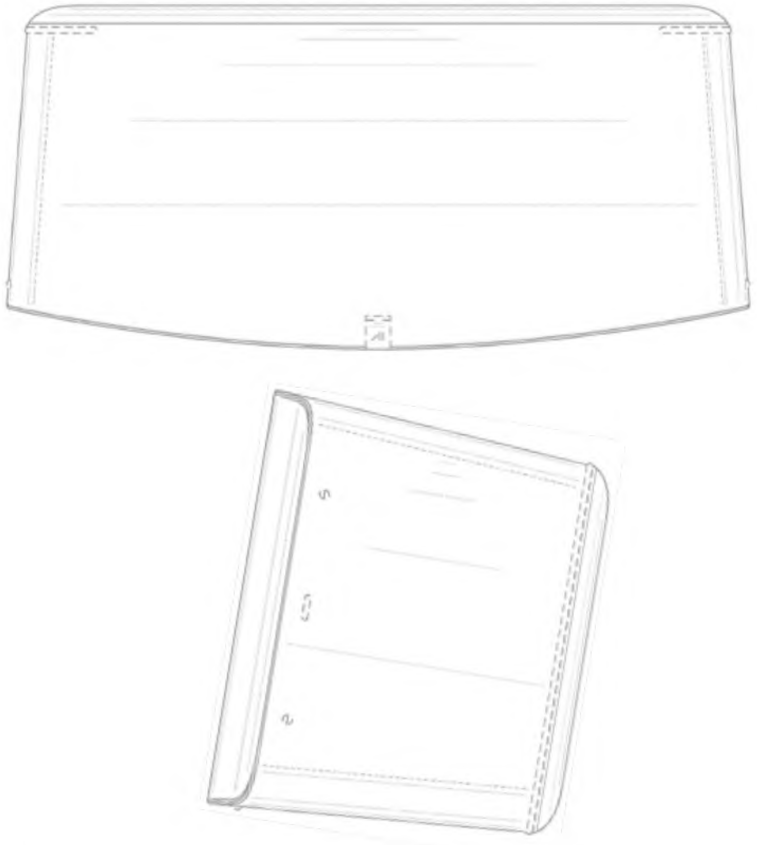
Issue Date: 9/5/2017



Playback device

U.S. Patent No. D768,602; 4/25/2015





"With the new Play:5, the company revisits its flagship speaker with a stunning new design…." - Gizmodo, October 29, 2015[1]

"It's sleek, minimal and will fit easily into any home, not matter the décor." - Tech Radar, November 21, 2017[2]

"Sonos' products have always been praised for their design and functionality…." - Engadget, October 29, 2015[3]

[1] https://gizmodo.com/sonos-play-5-review-wireless-music-made-elegant-1739240153
[2] http://www.techradar.com/reviews/audio-visual/hi-fi-and-audio/audio-systems/sonos-play5-657133/review
[3] https://www.engadget.com/2015/10/29/sonos-play-5-review-2015/

Playback device

U.S. Patent No. D768,602; 4/25/2015

"[A]nyone looking at a Google Home Max wants to know how it compares to Sonos Play:5 and vice versa. **They are too similar in form**, price, and function…." - Liisten, December 22, 2017[1]

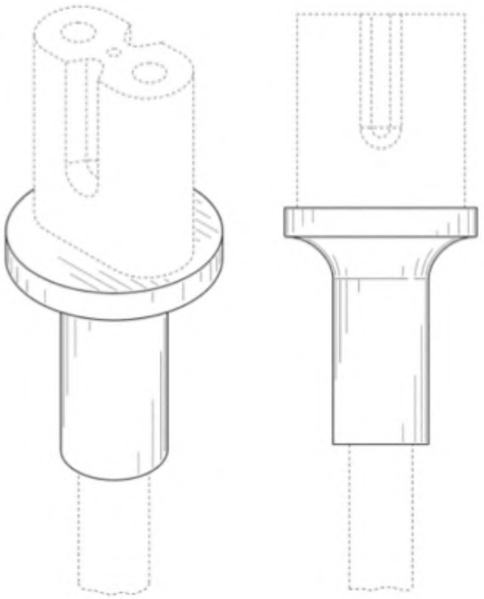
"It's a serious speaker – **closer in size to Sonos' flagship Play:5 than any smart speaker before it**…." - The Verge, December 20, 2017[2]

"Its size…reminds me of the Sonos Play:5…." - Engadget, December 19, 2017[3]

[1] http://liisten.com/google-home-max-vs-sonos-play-5
[2] https://www.theverge.com/2017/12/20/16797728/google-home-max-smart-speaker-assistant-review
[3] https://www.engadget.com/2017/12/19/google-home-max-review/

Power plug

U.S. Patent No. D796,447; 4/8/2015

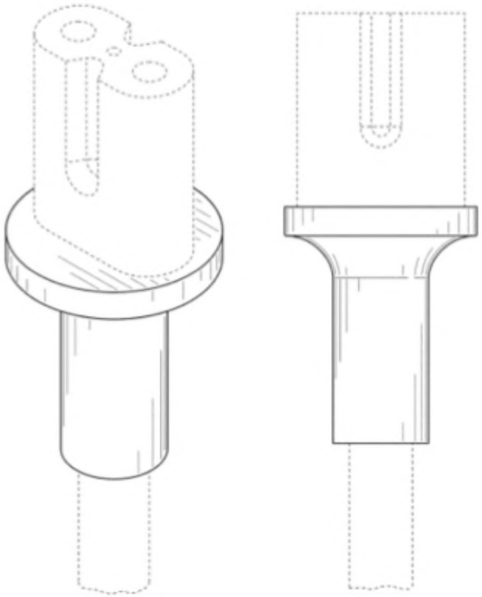


"Sonos is one of very few companies that designs entirely custom power plugs at both ends for no reason other than it wants them to look and feel good." - Engadget, October 29, 2015*

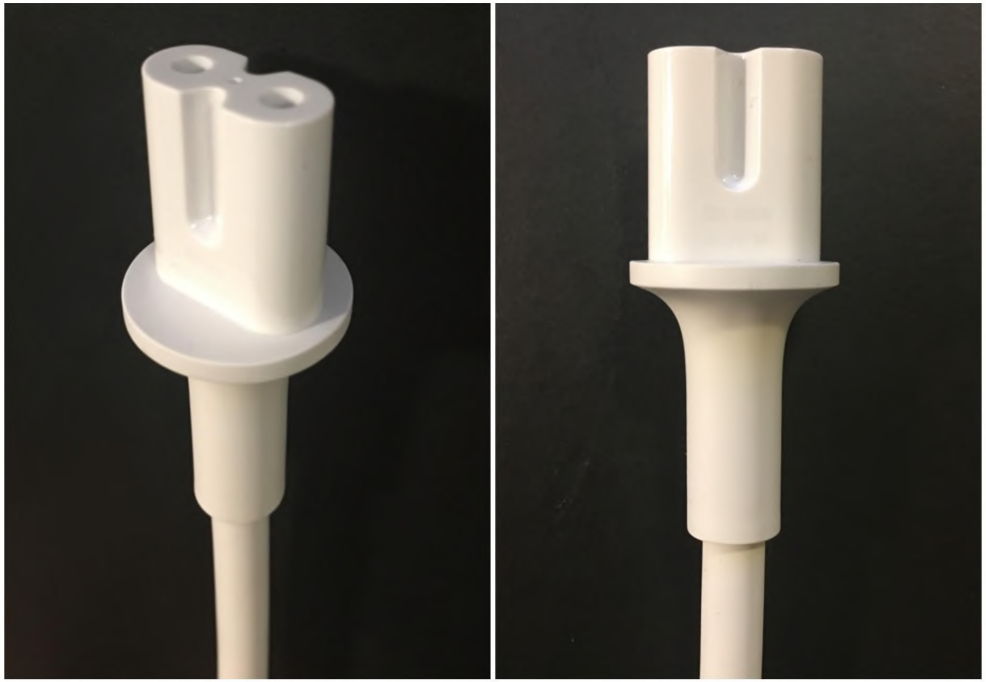
* https://www.engadget.com/2015/10/29/sonos-play-5-review-2015/

Power plug

U.S. Patent No. D796,447; 4/8/2015



Sonos Play:5 power plug



Google Home Max power plug

Subject matter of interest but not touched upon today:

Audio Content	Platform	Player	Control	Outside Household
Audio from controller	Group management	**Antennae switching**	**Discover/Find content**	**Cloud queue**
Audio from LAN device	**Master selection**	Audio calibration	Group management	**Cross-service integration**
Audio via WAN	**Networking**	**Audio processing**	**Playback control**	**Retail and marketing**
Line-in audio switch	**Queue management**	Industrial Design	**Queue management**	**Social queues**
	Setup	**Fault tolerance**	**Setup**	
	Stereo pair	**Microphone switching**	**Social (Party mode)**	
	Synchronized playback	**Networking**	**User interface design**	
	Voice assistant	Orientation-based audio	Volume control	
		Orientation check		
		Playback control		
		Power management		
		Queue management		

SONOS

The Home Sound System